The EDISON ELECTRIC INSTITUTE BULLETIN

February 1958

PUBLIC
DETROIT

Sales Conference Program

1958: Year of Decision in Atomic Power

Elmer L. Lindseth

IEC, Its Meaning and Hopes

Glenn S. Young

Metal Sheath Electric Heater Course

Robert R. Johnson

Expansion of Dayton P&L's F.M. Tait Station

I. C. Eppley, H. E. Gismond, R. B. Killen

Published Monthly by Edison Electric Institute

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities)

November, 1956-1957

SOURCE AND DISPOSAL OF ENERGY—MONTH OF NOVEMBER

	1957	1956	%
NET GENERATION* (Kwhrs in Thousands)			
By Fuel Burning Plants	40,885,995	41,335,916	− 1.1
By Water Power Plants	10,902,033	9,315,541	+17.0
Total Generation	**51,788,028**	**50,651,457**	+ 2.2
ADD—Net Imports Over International Boundaries	333,918	333,615	+ 0.1
Less—Company Use	149,995	133,831	+12.1
Less—Energy Used by Producer	1,103,546	1,008,785	+ 9.4
Net Energy for Distribution	**50,868,405**	**49,842,456**	+ 2.1
Lost and Unaccounted for	4,826,569	5,234,379	− 7.8
Sales to Ultimate Customers	**46,041,836**	**44,608,077**	+ 3.2

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of November 30th			
Residential or Domestic	46,774,937	45,623,409	+ 2.5
Rural (Distinct Rural Rates)	1,638,310	1,688,938	− 3.0
Commercial or Industrial:			
Small Light and Power	6,186,728	6,129,824	+ 0.9
Large Light and Power	309,645	296,049	+ 4.6
Other Customers	182,576	176,430	+ 3.5
Total Ultimate Customers	**55,092,196**	**53,914,650**	+ 2.2
KILOWATTHOUR SALES—During Month of November (Kwhrs in Thousands)			
Residential or Domestic	12,322,153	11,046,758	+11.5
Rural (Distinct Rural Rates)	740,585	768,482	− 3.6
Commercial or Industrial:			
Small Light and Power	7,782,104	7,275,805	+ 7.0
Large Light and Power	23,357,038	23,710,913	− 1.5
Street and Highway Lighting	490,622	454,350	+ 8.0
Other Public Authorities	982,298	942,408	+ 4.2
Railways and Railroads:			
Street and Interurban Railways	175,618	198,775	−11.7
Electrified Railroads	155,251	163,855	− 5.3
Interdepartmental	36,167	46,731	−22.6
Total to Ultimate Customers	**46,041,836**	**44,608,077**	+ 3.2
Revenue from Ultimate Customers (Thousands)	**$773,480**	**$730,938**	+ 5.8

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended November 30, 1957			
Kilowatthours per Customer	3,156	2,956	+ 6.8
Average Annual Bill	$80.79	$76.86	+ 5.1
Revenue per Kilowatthour	2.56¢	2.60¢	− 1.5

* By courtesy of the Federal Power Commission.

THE EDISON ELECTRIC INSTITUTE BULLETIN is published monthly by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of members of the Canadian Electrical Association.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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The EDISON ELECTRIC INSTITUTE BULLETIN

February, 1958

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CONVENTIONS AND MEETINGS

1958

MARCH

4 ECAP Copy Group Meeting, Blackstone Hotel, Chicago, Ill.

4- 5 PEA Employee Training Conference, Personnel Practices Committee, State College, Pa.

5 PIP Inter-Regional Committee Meeting, Blackstone Hotel, Chicago, Ill.

6- 7 Pacific Coast Electrical Association Business Development Section, Statler Hotel, Los Angeles, Calif.

12 PIP Steering Committee Meeting, Biltmore Hotel, Room 133, New York City, N. Y.

13-14 Public Utilities Advertising Association Regional Meeting, Montreal, Canada

Week of 17th Rocky Mountain Electrical League Electric Meter Institute, University of Denver, Denver, Colo.

20 EEI Industrial Relations Committee, Headquarters, New York City

24-27 EEI 24th Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

27-28 Oklahoma Utilities Association Annual Convention, Oklahoma Biltmore Hotel, Oklahoma City, Okla.

27-28 Pacific Coast Electrical Association, Engineering & Operations Section, Sheraton Palace, San Francisco, Calif.

31-Apr. 2 Southeastern Electric Exchange Annual Confrence, Boca Raton Hotel, Boca Raton, Fla.

APRIL

8- 9—Indiana Electric Association Young Men's Utility Conference, Evansville, Ind.

11 Maryland Utilities Association Annual Business Conference, Lord Baltimore Hotel, Baltimore, Md.

13-15 Rocky Mountain Electrical League Annual Spring Conference, Shirley-Savoy Hotel, Denver, Colo.

14-16 EEI-AGA 1958 National Conference of Electric and Gas Utility Accountants, Shamrock Hilton Hotel, Houston, Texas

16-18 Missouri Valley Electric Association Engineering Conference, President Hotel & Municipal Auditorium, Kansas City, Mo.

16-18 Southeastern Electric Exchange Heat Pump Steering Committee, Leisure House, Tampa Electric Co., Tampa, Fla.

17 EEI Industrial Relations Committee, Headquarters, New York City

21-22 Southeastern Electric Exchange, Engineering & Operations Section, Buena Vista Hotel, Biloxi, Miss.

23-24 Pacific Coast Electrical Association Administrative Services Section, Hotel Valley Ho, Scottsdale, Ariz.

23-25 Northwest Electric Light & Power Association Engineering & Operation Section, Chinook Hotel, Yakima, Wash.

24-25 PEA Prime Movers Committee, Eastern Shore, Md.

1958

24-25 PEA Meter Committee, Galen Hall, Wernersville, Pa.

27-30 EEI Accident Prevention Committee, Commodore Perry Hotel, Toledo, Ohio

28-30 EEI Purchasing and Stores 1958 Annual Meeting, Hotel Nicollet, Minneapolis, Minn.

MAY

1 EEI Area Development Committee, Biltmore Hotel, New York City

1- 2 PEA Industrial Sales Conference, Skytop Lodge, White Haven, Pa.

5- 7 EEI Prime Movers Committee, Mark Hopkins Hotel, San Francisco, Calif.

7 PEA Customer Contact Committee—Customer Relations Conference, Hotel Hershey, Hershey, Pa.

8- 9 EEI Transmission and Distribution Committee, Biltmore Hotel, Los Angeles, Calif.

12-13 EEI Electrical System and Equipment Committee, Radisson Hotel, Minneapolis, Minn.

12-13 EEI Hydraulic Power Committee, Hacienda Motel, Fresno, Calif.

14-16 New Jersey Utilities Association Spring Meeting, Seaview Country Club, Absecon, N. J.

14-16 Pacific Coast Electrical Association Annual Convention, Hotel del Coronado, Coronado, Calif.

15-16 EEI Industrial Relations Committee, Shreveport, La.

15-16 PEA Relay Committee, Cleveland, Ohio

19-21 Northwest Electric Light & Power Association Business Development Section, Advertising & Public Relations Committee and Rate Research Committee, Rainbow Hotel, Great Falls, Mont.

25-27 Wisconsin Utilities Association Accounting Section Convention, Lake Lawn Lodge, Delavan, Wis.

29-30 Southeastern Electric Exchange Industrial Power Sales Conference, Edgewater Gulf Hotel, Gulfport, Miss.

JUNE

4- 6 Northwest Electric Light & Power Association Accounting & Business Practices Section, Olympic Hotel, Seattle, Wash.

6 Public Utilities Association of the Virginias Accident Prevention Conference, Hotel Roanoke, Roanoke, Va.

9-11 EEI 26th Annual Convention, Boston, Mass.

22-25 Michigan Electric Association Annual Convention, Grand Hotel, Mackinac Island, Mich.

SEPTEMBER

8- 9 EEI-AGA 1958-59 Accounting Division and Section Organization Meeting, Netherland Hilton Hotel, Cincinnati, Ohio

22-24 EEI Meter and Service Committee, Plaza & Driscoll Hotels, Corpus Christi, Texas

The EDISON ELECTRIC INSTITUTE
BULLETIN

Competition, Leadership Will Be Emphasized at 24th EEI Sales Conference

THE relationship of energetic sales programs to the continued success of the electric utility industry, the competition which affects present and future load growth, and the necessity for strong leadership within the industry will be presented as highlights of the 24th Annual EEI Sales Conference to be held in Chicago's Edgewater Beach Hotel, March 24-27.

The entire Sales Conference program, sponsored by the EEI Commercial Division, has been arranged to leave few—if any—of the major electric sales problems unexplored. The Conference will be directed by T. O. McQuiston, Chairman of the EEI Commercial Division Executive Committee, and Vice President and General Sales Manager, Metropolitan Edison Co., and Residential and Commercial Sales Manager, Pennsylvania Electric Co. M. I. Allen, Vice President, Sales, Philadelphia Electric Co., is Chairman of the Program Committee for the 24th Annual EEI Sales Conference.

Prominent Speakers Engaged

Prominent representatives from the electric utility industry, and from the electric appliance manufacturing industry, as well as those from other interested organizations will present the sales picture from their respective standpoints and offer suggestions for improving this picture.

On Monday, March 24, the individual committees of the Commercial Division will meet in all-day sessions. The Division's four Groups—Commercial Sales, Farm, Industrial Power and Heating, and Residential—will meet on Tuesday, March 25.

T. O. MCQUISTON

Chairman of the Commercial Division Executive Committee

General Sessions will be held all day Wednesday, March 26, and Thursday morning, March 27, in the Grand Ballroom of the Edgewater Beach.

The Home Service Breakfast is to be held Tuesday morning at 7:30 in the Michigan Room and at noon on Tuesday the Farm Luncheon is scheduled in the Polynesian Room. At the same time, the Public Utilities Advertising Association Luncheon is planned in the Michigan Room. On Tuesday afternoon at 4, the Better Light Better Sight Bureau Executive Committee has scheduled a meeting.

On Wednesday, March 26, the EEI Awards Luncheon will he held in the Polynesian Room.

The General Luncheon will be held in the Polynesian Room on Thursday, March 27.

Several joint committees will meet on Sunday, March 23, as well as the EEI Wiring Promotion Committee. They include the National Electrical Week Committee, Committees of the Better Light Better Sight Bureau, and Committees of the Industrial Electrification Council. The BLBS Bureau Luncheon is scheduled for Sunday, also, in the Lincoln Room.

The tentative program follows:

General Sessions

Mr. McQuiston will make the opening remarks on Wednesday morning, March 26, at the First General Session in the Grand Ballroom. He will report on committee accomplishments during the past year and speak briefly on current activities. A part of his address will be devoted to the current problems facing the sales and promotional segments of the electric utility industry. Mr. McQuiston is to be the presiding officer at the day's sessions.

J. W. McAfee, President of Edison Electric Institute and President, Union Electric Co., as the next speaker, has chosen as his subject "The Ultimate Objective of Sales"—an analysis of major current problems of the electric industry and how sales activities may aid in solving these problems.

Walter E. Hoadley, Jr., Treasurer, Armstrong Cork Co., has chosen as the title of his talk, which will follow that of Mr. McAfee's, "Let's Be Realistic."

John F. Childs, Vice President, Irving Trust Co., as the last speaker of the Morning Session, in an address titled "Investors' Views of Sales," will give his opinion of the economic conditions expected during the next several years. Mr. Childs has had many years' experience as an investment banker and analyst and will tell also what investors look for when evaluating utility stocks, with special emphasis on the factor of sales and load building.

Afternoon General Session

The Afternoon Session on Wednesday begins at 2:30 with H. G. Isley, General Sales Manager, Carolina Power & Light Co., presenting an address titled "The Industrial Sales Answer."

"The QED's of Commercial Sales Promotion," by E. J. Ingram, Vice President, Jersey Central Power & Light Co. and New Jersey Power & Light Co., is the second address planned for Wednesday afternoon.

"Answering the challenge in Residential and Rural Sales," by J. S. Gracy, Vice President, Florida Power Corp., is scheduled next, to be followed by the viewpoint of the electric sales picture by P. H. Powers, President, West Penn Power Co.

Les Giblin, Ridgewood, N. J., founder and director, The Les Giblin Seminars on Human Relations, will end the first day's General Sessions with a talk on "Human Relations in Selling."

Final General Session

At 9:30 a.m. Thursday, March 27, the final General Session begins with a presentation of *Life* magazine research information on the electrical aspects of what homeowners want in their homes. Concerned with the "Appliance Future," these conclusions are from the *Life* Study of Consumer Expenditures and will be the first presentation of these facts. Bertram J. Lange, Manager, Marketing Services, *Life* Marketing Department, will present the study.

"Facing the Competition" is the subject of the next address, by C. J. Witting, Vice President, Consumer Products Group, Westinghouse Electric Corp. He will tell why strong leadership is necessary in the electric utility industry to combat competitive influences affecting present and future load growth.

R. E. Boian, Manager, Live Better Electrically, General Electric Co., has chosen for the title of his talk "Make Mine Medallion," in which he will give the latest LBE developments, with special emphasis on the Medallion Home.

George W. Ousler, Vice President, Duquesne Light Co., will have as his subject "Live Better Electrically—an Industry Activity" and will discuss the proposed future support of the program by the industry.

The final speaker scheduled is Dr. H. F. Alderfer, Deputy Superintendent, Department of Public Instruction, Commonwealth of Pennsylvania, whose subject "Community Growth — Government and Utility" will concern area development — a new subject on the Conference agenda. The relationship of government and utility in determining community growth will be emphasized.

Don G. Mitchell, chairman of the Board of Sylvania Electric Products, Inc., has been scheduled as speaker at the General Luncheon Session, at 12 noon Thursday, March 27. He has chosen as his theme "The Kind of Work That Brings Results," and using his knowledge and experience of the electrical manufacturing industry, will point out how intelligent sales effort can bring the desired sales results.

Awards Luncheon

The Awards Luncheon will be held in the Polynesian Room, Wednesday, March 26, at 12 noon, with M. C. Albrittain, Vice President of the Baltimore Gas and Electric Co., and Chairman of the EEI Awards Committee, presiding.

Twelve sales promotion awards in four categories are to be presented to electric utility companies for outstanding promotion in the Residential market, Commercial market, Farm market and Industrial market. This new Award program was established by Edison Electric Institute in late 1957 to recognize and encourage sales programs of the electric companies.

In the Residential, Commercial and Industrial Sales Promotion contests, an award will be given in each of three classes: Class A (300,000 or more customers); Class B (100,000 or more customers); Class C (less than 100,000 customers), and in the Farm Sales Promotion contest, these classifications were established, an award to be given in each category: Class A (30,000 or more farm customers); Class B (15,000 to 30,000 farm customers); Class C (less than 15,000 farm customers).

The awards are handsome bronze plaques, suitably inscribed.

On Tuesday, March 25, all-day meetings of the four Commercial Division Groups have been scheduled separately.

Commercial Sales Group Meeting

The Commercial Sales Group will meet in the South Terrace of the Edgewater Beach. G. G. Wheeler, Northern States Power Co. and Chairman of the EEI Street Lighting Committee, will preside at the Morning Session. H. R. Jones, West Penn Power Co. and Chairman of the Commercial Sales Group, will deliver the opening remarks at 9:30 a.m.

First speaker of this session is H. L. Cramer, Manager, Agency and Construction, Industrial Sales Department of Westinghouse Electric Corp., who will discuss "The Look of Prosperity." To help communities to help themselves get "the look of prosperity," Westinghouse has established a Commercial Modernization program. This program and the part of local electric utilities in its successful execution form the basis for Mr. Cramer's talk.

Under the title "The Mighty Mite of Utility Sales," Alfred M. Wade, Vice President, The Connecticut Light & Power Co., will tell how plans for construction of the National System of Interstate and Defense Highways has focused new attention on the importance of good highway and street lighting. Connecticut has decided to light continuously 53 miles of the Connecticut Turnpike. The far-flung implications of this pioneering step in continuous lighting of the open road will be discussed by Mr. Wade.

"Commercial Electric Cooking — What, Why and How" is the title of an address to be delivered by Hugh C. Isley, General Sales Manager, Carolina Power & Light Co., as the closing talk of the Morning Session.

From a load-growth viewpoint, commercial electric cooking has been called "the sleeping giant." Mr. Isley will review the results reaped by his company by its constant "prodding of this sleeping giant" for 21 years.

At the Afternoon Session of the Commercial Sales Group meetings, G. W. McElhaney, Ohio Edison Co., and Chairman of the EEI Electric Space Heating and Air Conditioning Committee, will preside.

At 2:15 p.m., Hugo E. Beck, Superintendent, Bayless School District, St. Louis, will discuss how heating of schools electrically has aroused the interest of utility companies all over the country and in his address "Why We Chose Electric Heating," will report first-hand the reasons why the Bayless School District chose electric heating.

Further discussion of this subject —from the electric company's point of view, is planned by J. B. Napier, Power Sales Engineer, American Gas and Electric Service Corp., in an address titled "School Heating—What's Happening." Among the most aggressive boosters of electric heating are the operating companies of AG&E. Mr. Napier will speak about school heating, based upon the combined experience of the AG&E companies in this field.

Hugh Roberts, Alabama Power Co., will report on the Electric Resistance Space Heating and Heat Pump Handbook which is in preparation for publication. Mr. Roberts is chairman of the subcommittee charged with publication of the handbook.

"We've Got the Weather Licked," a summary of how "in-door weather" can be controlled mechanically is the subject of the talk by Glydewell Burdick, Wisconsin Power and Light Co.

"Off-Peak Electric Space Heating" is the subject chosen by Robert C. Geyer, Architectural Engineer, Commonwealth Edison Co. Off-peak electric space heating offers the promise of controlled load for electric utilities and of space heating by electricity at reasonable cost for the utility customers. This forms the basis for Mr. Geyer's discussion.

At 4 p.m., the closing address of the Afternoon Session will be presented by H. M. Brundage, General Manager, Weathertron Division, General Electric Co. His address, titled "Long Pants—At Last," concerns energetic promotion of electric resistance heating and the heat pump.

Farm Group Meeting

On Tuesday morning, the Farm Group meets in the West Lounge, with Morris H. Lloyd, Niagara Mohawk Power Co., and Chairman of the EEI Farm Development Committee, presiding.

M. O. Whithed, Atlantic City Electric Co., and Chairman of the EEI Farm Group, will present the opening remarks at 9:30.

The first speaker of the Farm Group's Morning Session, Fred M. Kimball, Vice President, Kansas Gas and Electric Co., will discuss "The Challenging Farm Market." Mr. Kimball has served as chairman of a Kansas Farm Electrification Council which has developed a number of successful state-wide educational and promotional programs. He will review several of the programs in which his company participates and will offer some suggestions for reaching the farm market.

"Future Electric Sales Opportunities for Farm Equipment Dealers" is the next talk on the program, to be delivered by George R. Seferovich, editor, *Implement and Tractor* magazine. He believes farm equipment dealers are the logical group to sell and service electrical farm equipment. He will present an interesting report on the role of electric service in the expanding farm market.

A look into the future and what may develop for the use of electrical energy forms the text of the talk by Charles E. Ball, editor, *Farm Journal* magazine. The talk is titled "Imagineering the Next 50 Years." He believes "imagineering" is not fanciful dreaming, but aggressive, daring planning and analysis based on sound engineering.

At the Farm Luncheon in the Polynesian Room at 12 noon, Dr. Earl L. Butz, Dean and Director of Agriculture, Purdue University, discusses "Agriculture—an Expanding Industry." A nationally-known expert on farm problems, Dr. Butz was Assistant Secretary of Agriculture in the U. S. Department of Agriculture until 1957.

At the Farm Group's Afternoon Session, beginning at 2 o'clock, Homer M. Gibbs, Texas Power & Light Co., and Chairman of the EEI Farm Promotion Committee, will preside.

The first speaker of the Afternoon Session is Odin Wilhelmy, Supervisor, Rural Division, The Cincinnati Gas & Electric Co., who will discuss "The *Ohio Farmer* Farm Better Electrically Contest." Mr. Wilhelmy led the movement to develop an Ohio statewide Farm Better Electrically contest. He will explain the program and give a progress report on the activity which is sponsored by the Ohio electric companies and *Ohio Farmer*.

"Working with Farm Equipment Dealers" is the title of the address to be delivered by R. G. Harvey, Rural Service, Niagara Mohawk Power Corp. He has held a number of Farm Better Electrically meetings for farm equipment dealers located in the service area. He will give a report of these meetings—how they were organized, the program presented and the results achieved.

A report on electronically controlled lighting will be presented by R. K. Derry, Systems Agricultural Rural Service Supervisor, Ohio Power Co. The title of the address is "Farm Yard Lighting."

"Farm Better Electrically Dealer Days," a talk by L. H. Hammond, Manager of Rural Development, New York State Electric and Gas Corp., and a Farm Better Electrically Roundup discussion, with Mr. Gibbs in charge, will complete the Farm Group's sessions.

Industrial Power and Heating Group Meeting

The Industrial Power and Heating Group will meet in the East Lounge. George M. Allen, Detroit Edison Co., and Chairman, Competitive Service Committee, will preside and opening remarks will be delivered by Frank E. Wiatt, The Cincinnati Gas & Electric Co., and Chairman of the EEI Industrial Power and Heating Group.

B. J. Martin, publisher, B. J. Martin Publications, Inc., is the first speaker scheduled on the Morning Session. Using "What's New?" as the title of his address, he will point out new opportunities in electric sales.

"Multi-Stage Heat Pumps" will be discussed by Robert G. Werden, General Sales Manager, Engineered Products.

C. S. Reed, Vice President, Duke Power Co., will tell "What the Industrial Plant Means to the Community and to the Utility." This is the last

scheduled talk of the Morning Session.

With Mr. Wiatt presiding, the Afternoon Session opens with a talk by G. G. Freyder, Commonwealth Edison Co., titled "Centrifugal vs. Absorption" in which he will review installation and operating costs of both centrifugal and absorption refrigeration systems, pointing out the comparative advantages and disadvantages of each.

Under the title "New Reliability Standards Needed for Tomorrow's Automation," H. Thomas Hallowall, Jr., President, Standard Pressed Steel Co., will explain how recent developments and applications in automation have created demands on reliability of product as well as production equipment.

Dr. Harry T. Osborn, Jr., District Manager, Tocco Division, The Ohio Crankshaft Co., closes the Afternoon Session with a discussion of "Recent Developments in Induction Heating."

Residential Group Meeting

The Residential Group will meet at 9:30 a.m. on Tuesday in the Grand Ballroom, for its Morning Session, with R. L. Coe, Chairman of EEI's Residential Group and Residential Sales Manager, Union Electric Co., presiding.

The first speaker scheduled is M. G. Kennedy, Manager, Sales, Marketing & Public Relations Dept., Ebasco Services, Inc., who will present an analysis of utility load building efforts and opportunities with specific emphasis on net profit opportunities.

"Trial by Measure," by Miss Elizabeth Parker, Atlanta Power Co., and Chairman of the EEI Home Service Committee, will be a mock courtroom trial describing home service programs that sell kwhr.

J. C. Forbes, Residential Sales Manager, Large Lamp Dept., General Electric Co., will describe the "Academy of Lighting Arts," a new program to train utility and dealer sales people on how to sell residential lighting.

The Morning Session is to be closed with an address by Arthur S. Goldman, Market Research Director, *House and Home* magazine. His talk, "They're Easier to Finance Now," is a review of the new FHA financing program and opportunities it offers for greater electrification of new homes.

24th Annual EEI Sales Conference

Chicago, Ill.
Edgewater Beach Hotel

Sunday, March 23

Committee Meetings

Wiring Promotion Committee Meeting

Monday, March 24

EEI Commercial Committee Meetings

Tuesday, March 25

Home Service Breakfast, Michigan Room 7:30 a.m.

Group Meetings, 9:30 a.m. to 12 noon and 2:15 to 4 p.m.

Residential—Ballroom

Farm—West Lounge

Commercial Sales—South Terrace

Industrial Power and Heating—East Lounge

Farm Luncheon, 12 noon, Polynesian Room

PUAA Luncheon, 12 noon, Michigan Room

BLBS Executive Committee, 4 p.m.

Wednesday, March 26

General Sessions, Grand Ballroom, 9:30 a.m.—12 noon and 2:30 p.m.—4 p.m.

Awards Luncheon, 12 noon, Polynesian Room

Thursday, March 27

General Session, Grand Ballroom, 9:30 a.m.—12 noon

General Luncheon, Polynesian Room, 12 noon

Opening the Afternoon Session at 2 o'clock, E. W. Smith, President, National Mineral Wool Association, and Vice President, Owens-Corning Fiberglass Corp., has chosen as his subject the possibilities of assuring human comfort with electric heating and insulation techniques under the title "Assure Their Comfort and It's Easy to Sell."

Miss Elizabeth Sweeney Herbert, household equipment editor, *McCall's* magazine, discusses "What the Congress of Better Living Means to You." She will present a resume of this meeting and an analysis of its relationship to electrical use in the home.

Closing the Afternoon Session will be an address, "Let's Go," by Charles K. Reiger, Chairman, Major Appliance Section, NEMA and Vice President, General Electric Co.

Home Service Breakfast

Willard Pleuthner, Batten, Barton, Durstine & Osborn, will be the guest speaker at the Home Service Breakfast at 7:30 a.m. Tuesday, March 25, in the Michigan Room. He will conduct a "Brainstorming Session" with a panel of 14 on the subject "What Does Management Expect of Home Service?"

Recent EEI Publication

Farm Electrification Catalogue of Visual Aids

EEI Pub. No. 57-17. Information about movies and slides available for use in selling the farm market. Information collected by the Farm Development Committee of the Farm Group, Commercial Division, Edison Electric Institute. 18 pages. Price: 50 cents.

This publication contains listings of motion picture titles in 14 categories as well as film strips and slides.

Motion pictures are available on the subjects of crop drying, electricity - drama, electricity - science, general farming, irrigation, lighting, living electrically, materials handling, people and places, poultry, safety, water systems, welding and wiring.

Film strips and slides cover brooding, crop drying, lighting, living electrically, materials handling, poultry, water, wiring.

Many of the films are in color with sound. Some of the films can be purchased outright for a nominal cost. The booklet contains also a guide to the General Electric Co. film library locations which provides free 16mm sound films on a loan basis.

1958: Year of Decision in Atomic Power

By Elmer L. Lindseth
President, The Cleveland Electric Illuminating Co.

An address before the Cleveland Chamber of Commerce and the Electrical League of Cleveland, Cleveland, Ohio, Feb. 4, 1958

JUST a few months ago—on Oct. 4, 1957—the Russians put Sputnik I into orbit around the earth.

That was certainly big news. To a lot of people it was not only big news, but alarming news. In this single event, they saw proof positive that the Russians had licked us hands down at our own game—technology.

Amid the confusion, some calmer voices were heard pointing out that one round doesn't make a prizefight. Then, a short time ago—less than four months after the launching of Sputnik I — the United States put into orbit 1958 Alpha, otherwise known as Explorer. We may now hope that this has reassured to some degree a number of the pessimists who were so busy predicting America's eclipse as a world power.

Nevertheless, there are still a lot of skeptics who belittle America's standing in the worldwide technological race for survival.

The simple fact is, however, that although we may at one time or another seem to be temporarily outstripped in some fields, such as satellites—and possibly missiles—we are definitely in the lead in a great many others. On balance, we have an unquestionable overall lead.

One area in which we hold a substantial advantage is the important one of nuclear power.

Since its very inception, America's nuclear power program has had its critics. Even in the pre-sputnik era, some called our atomic power program inadequate. And the Russian satellite launchings gave them further ammunition. Along the way, these critics gained the support of a number of people of good intentions but without full acquaintance with the facts.

The facts about our atomic power program are not widely understood. Because of this, people don't appreciate where the United States stands today, and what the outlook is for the future. Yet it is very important that they should know the facts.

Operation of a Reactor

As a preliminary, let us review briefly what atomic, or nuclear, power is. What's the nature of a so-called reactor? How does one operate? In what respects is atomic power different from ordinary power?

Many people are surprised to learn that a nuclear power plant is practically identical in principle with a conventional steam power plant. The same kind of steam drives the same kind of generators to produce exactly the same kind of electricity. The only thing that is basically different is the fuel—that is, the source of the heat that evaporates water into steam.

In a conventional plant, the heat is produced by burning a fossil fuel, usually coal, oil, or gas, in a furance or boiler. In a nuclear plant, the heat is produced by burning nuclear fuel in a reactor. From there on, the heat makes steam, the energy in the steam is converted into mechanical energy, the mechanical energy into electrical energy, the electrical energy into better living.

Fuels for Nuclear Plants

The nuclear plants operating or under construction today all use as fuel one of the isotopes of uranium, uranium 235, which occurs in nature. However, two other possible fuels are known, both man-made—uranium 233 and plutonium 239. These materials are termed fissionable because, under the right conditions and control the nuclei of their atoms may be caused to split or fission in a controlled chain reaction. This is what takes place in a nuclear reactor, and the result is the release of a large amount of usable heat.

Parenthetically, the most abundant form of uranium occurring in nature, the isotope U-238, is itself not fissionable. It may, however, be readily converted—transmuted—into the man-made element plutonium 239, which is fissionable and which is our basic weapons material.

The question is sometimes asked: But what if this controlled reaction gets *out* of control? Will the reactor explode like a bomb?

The answer is definitely no. Creating an atomic bomb isn't that simple. A bomb requires a number of precisely-regulated components and conditions which are just not present in a nuclear reactor. Any talk about the explosive danger of nuclear power plants can be traced to an instinctive association of words and ideas. Reactor design principles give any such talk no basis in fact.

The only potential public hazard—and it is extremely remote—is associated with the release of radioactive fission products. These must be properly contained. And you may be very sure that no atomic plant is ever licensed to operate by the Atomic Energy Commission until they are convinced that this problem has been satisfactorily solved.

Every atomic power plant must get two licenses from the AEC; one to authorize its construction, and a second one, after construction is complete, to permit it to begin operating. This second license is granted only after the plant is certified as presenting no hazard to the public.

So much then for our description of a nuclear reactor. Briefly, it is a complex apparatus in which the heat-producing chain reaction takes place under constant control.

The amount of heat given off can be increased or decreased at will, and in some cases is even self regulating. The heat turns water into steam in another apparatus; and from there on, the operation of the generating

plant is exactly the same as that of a coal-burning plant, with all its elaborate and complex components.

Free Power A Myth

We have only to appreciate the nature of atomic power as I have described it to see why it will never be as "free as the air" or "too cheap to meter," despite the claims of some optimists. The only expense eliminated by the atomic reactor is the cost of the conventional fuel—usually coal. And although, believe me, I am by no means indifferent to the cost of coal, it is still only a fraction of the total cost of supplying power. To make matters worse, the atomic fuel substituted for coal today is *more* expensive than coal. And the same is true of the capital cost of the apparatus to utilize that atomic fuel.

So as of today, and in the near-term future, when a nuclear reactor is used in place of a coal-burning furnace in any power plant anywhere in the world—and I emphasize *anywhere* in the world—the cost of operation is increased instead of decreased. And in most cases the increase is a big one. For example, the cost of producing a kilowatthour of electricity at the atomic plant located in Shippingport, Pa., which went into operation recently, is ten or more times as great as the cost of producing the same kilowatthour in a coal-burning plant in that area. Ten times!

The cost of atomic power will, of course, be progressively reduced during the years ahead. That is the prime purpose of our present atomic power program in this country: to make atomic power competitive, dollar for dollar, with conventional power. It will be some years—probably at least ten—before this aim is achieved, because coal is cheaper and more abundant in the United States than in any other industrialized country in the world. Also, we keep constantly learning how to improve the economy of our coal-serving plants. But eventually, through research, development, and experiment, we'll bring nuclear power down to the same cost level as conventional power.

Where U. S. Stands Globally

All of this has a definite bearing on our competitive position in what has turned out to be an imaginary global atomic power race: Our objective has been different from the objectives of other nations, where fuel reserves are virtually exhausted. Because this has not been widely understood, the feeling has grown that our achievements have been inferior to the achievements of other nations. This is simply not true.

U. S. Holds World Lead

The United States today holds what Dr. Libby, scientific member of the U. S. Atomic Energy Commission, has termed "an absolutely commanding position" in nuclear power on the world stage. And under our present program we will maintain that position.

That statement may sound dogmatic, but a simple examination of the evidence justifies it completely. Let's look at what this country has accomplished in the past few years in the nuclear field.

As of the end of 1957, the total number of American reactors for all purposes—electric power, propulsion, testing, research, production and training—either completed, under construction, or in the planning stage, was 237. There is also a type of modification of a reactor known as a critical assembly using an external neutron source. If the number of these is included, the total figure goes up to 305.

The number of power reactors — that is, reactors for generating electricity or for the propulsion of vessels such as submarines or other naval craft—either built, under construction, or in the planning stages, is 88. In commenting on this figure Admiral Lewis L. Strauss, Chairman of the U. S. Atomic Energy Commission, said last month, "This total of 88 power reactors represents a program which, to our knowledge, is not approached by any other country, either in performance or planning."

Some of those 88 reactors have already chalked up an impressive record of performance in service. The atomic power plant of the submarine *Nautilus* has propelled the ship over 100,000 miles and is still going strong. The land-based prototype of the *Nautilus* power plant, in Idaho, has turned out an amount of power equivalent to over 50 million kwhr of electricity.

Since the *Nautilus* was launched it has been followed by two more atomic submarines, the *Seawolf* and the *Skate*, and several others are under construction. The keel has been laid for an atomic powered guided missile cruiser, the *Long Beach*. And in fact the Navy has announced its intention of employing atomic power in all combat ships. This country undoubtedly leads the world in the development of a nuclear Navy, and we intend to hold that lead.

Now, let's look at what has been accomplished with the other type of power reactor, the type designed to produce electric power in a land based generating plant. Here, of course, we touch on the interest and responsibility of the electric utility industry. You are entitled to ask what we as an industry have contributed to America's atomic power program, and what we intend to contribute.

Contribution of Independent Utilities

The participation of America's independent utility companies in atomic power progress began even before passage of the Atomic Energy Act of 1954, notwithstanding that until the Act was passed, the government had prohibited the ownership of fissionable material or reactors by industry and so there was little an independent utility could do about constructing nuclear power plants. The 1954 Act first authorized construction of privately-owned nuclear plants. In so doing, it stated: "It is therefore declared to be the policy of the United States that . . . the development, use, and control of atomic enery shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise."

In the intervening three and a half years the investor-owned utility industry has worked in close partnership with equipment manufacturers, other segments of industry, and the Atomic Energy Commission. There has been brought into being an all-inclusive program of research, development, and construction of nuclear power plants.

Five Plants in Operation

Today there are five atomic power plants in the United States turning out electricity. Two are at AEC installations. The other three are delivering kilowatts to the customers of investor-owned utility systems, although two of the reactors are government-owned, and the third owned by an equipment manufacturer.

One of these three, located at Shippingport, Pa., is owned by the AEC,

although Westinghouse Electric Corp. and Duquesne Light contributed to the cost. It is operated by Duquesne. It is the world's first large-scale atomic plant built exclusively for the production of electric power. It is usually overlooked that Britain's much-publicized Calder Hall plant is primarily for the production of weapons material, and that generation of electricity there is a by-product.

Two other American atomic plants presently serving customers of investor-owned utilities are the General Electric-Pacific Gas and Electric plant near Pleasanton, Calif., whose reactor is owned by General Electric Co.; and the AEC-owned sodium graphite reactor at Santa Susana, Calif., on the Southern California Edison Co., system.

These are only the beginning. Five additional large-scale nuclear plants for the production of civilian power are either under construction, or under contract. These are: the Enrico Fermi fast breeder plant of 100,000 kw being built near Monroe, Mich. by The Detroit Edison Co. and a group of utilities known as the Power Reactor Development Corp.; Commonwealth Edison's dual stage boiling water plant of 180,000 kw located southwest of Chicago; Consolidated Edison's pressurized water 275,000 kw plant being built at Indian Point, New York; the Yankee Atomic Electric Co. pressurized water reactor plant of 134,000 kw being built by a group of New England companies at Rowe, Mass.; and the Pathfinder single region boiling water reactor project of 66,000 kw to be built by the Northern States Power Co. and Central Utilities Atomic Power Associates, a group of utility companies on the Northern States system.

In all five of these plants the electric utilities concerned own and operate the nuclear reactors as well as the rest of the generating facilities. Two of them will be financed entirely by private industry, and the other three are receiving some AEC assistance. When they are all operating, in 1962, they will bring this country's total output of atomic power for civilian use to over 800,000 kw.

Five more electric utility industry projects are in the longer-range phases of planning and development.

One, being undertaken by the Carolinas-Virginia Nuclear Power Associates group, is directed toward a 17,000-kw heavy water moderated reactor in South Carolina.

Reactor for Florida

The East Central Nuclear Group has undertaken research and development on a 50,000-kw heavy water moderated, high-temperature, gas-cooled, pressure-tube reactor which will be built on the west coast of Florida by another group, the Florida West Coast Nuclear Power Group.

Pennsylvania Power and Light Co. and Westinghouse Electric Corp., recently joined by Baltimore Gas and Electric Co., are continuing research and development of an aqueous homogeneous slurry reactor, looking toward construction of a 70,000-to-150,000-kw plant by late 1963.

Pacific Gas and Electric Co. has announced that, either alone or in partnership with other California investor-owned utilities, it plans to propose construction of a large-scale nuclear plant to the AEC. The type of reactor under consideration is a large scale, single region boiling water type.

And the New England Electric system contemplates adding a large scale nuclear power plant to its system by 1964.

Research and Development Are Vital

Although this record of plant building and planning is impressive, I should point out that the real strength of America's atomic power program does not lie in the number of electric kilowatts we can produce. America will stay ahead in atomic power basically through intensive research and development. And in this field, the independent power companies are embarked on an all-out program.

Atomic power is immensely more expensive, and technologically vastly more difficult, than was foreseen even just a few years ago. This applies not only to the building of plants, but to the carrying out of research and development activities. Therefore, to spread costs and avoid needless duplication of effort, it is the practice of power companies to form into groups of anywhere up to a dozen or even more utilities and undertake nuclear projects cooperatively.

120 Companies Participating

At the moment, more than 120 companies in the U. S. are participating in one or more of 25 different projects concerned with study research, development, planning, or construction of nuclear plants. These companies serve more than half of the electric power customers in the nation. Their total expenditures on nuclear projects as presently planned will ultimately run to an estimated $500 million, and the total capacity of the nuclear plants on which they are working is about 1,300,000 kw. Undoubtedly these expenditures will be increased as the program continues to grow.

From such research and development activity will ultimately come the advanced, less costly, more efficient atomic power plants of the future; and it's the only way we'll get them.

The Foreign Situation

Now, what about other countries? What is the situation in Britain? In Russia? In the other nations interested in developing and using atomic power?

These countries are busy, to be sure. But their programs are not being conducted on anything like as broad a scale as this country's program. They are critically short of conventional fuels. Hence, they are more concerned with constructing workable plants today than they are in developing better plants for tomorrow.

The United States alone, among the world's industrialized nations, has a large supply of relatively cheap coal. We are by no means desperate for nuclear power. It will be many years before we can generate it as cheaply as coal-produced power, or will have any need to do so. Thus, our program is focused on bringing down ultimate costs. Because time is on our side, we can put our dollars to best use.

That is by no means true of countries like Britain. There, coal reserves are nearing exhaustion. Coal is costly, and imports of oil from overseas sources are both expensive and uncertain, as was graphically demonstrated during the Suez crisis.

It is only logical, therefore, for the British to concentrate their efforts on getting plants into operation as soon as possible. Time is working against them. Efficiency and cost are minor factors in their situation; their overriding need is for kilowatts. They are not at all happy about spending vast amounts of money on costly reactors which are obsolete when built, but in the circumstances they have little choice.

It is much the same story in the other European countries, including

Russia, where the major coal reserves are thousands of miles away from the industrial centers.

Other countries need atomic power now, at almost any cost. We do not. They don't have time for the research and development on a wide range of types that will reduce costs. We do. Therefore, their atomic programs are time-oriented. Ours can be dollar-oriented. The result, for us, will be vastly more efficient plants in the long run.

Research and Experimentation

There is in being today in this country a far-reaching program of research and experimentation, plus a wide variety of pilot and large-scale plants to provide us with practical operating experience. On this foundation, which no other country possesses, we will continue to build an atomic technology which will make today's achievements seem feeble by comparison. We have chosen our course wisely, and the future lies in our hands.

This is the background against which the question is raised today: Will the Congress decide to accelerate our atomic energy program by ordering the construction of a number of large scale government-owned plants? Or will they not?

My guess is that they will not order the building of these plants, notwithstanding strong efforts by a militant group to persuade them to do so. But it is by no means certain.

In my belief, the Congress will recognize that this country has a program in being that has given us our commanding lead in world nuclear technology. And further, that our lead can best be maintained and increased by a continuation of that program. Any program, of course, needs to be adjusted from time to time to our constantly increasing knowledge and experience. But the emphasis should stay on research and development.

Some Don't Agree

Not everyone in this country will agree with that conclusion. There are loud voices raised to assert that we have fallen behind in their hypothetical kilowatt race, and that only a crash program involving construction of large government-owned reactors will enable us to catch up.

As to whether we have fallen behind, the facts themselves refute that contention. And if they are not enough, there is the recent statement from the leaders of Euratom, the international organization which is coordinating the nuclear power programs of six European countries. These European experts asserted, "an impressive amount of research and development done both through the AEC and private industry has provided America with the most complete nuclear foundation in the world."

More large-scale, government-owned reactors in this country would achieve little, and would soak up millions of dollars of taxpayers' money needlessly. Worse, they would divert our energies and resources away from the vital research and development work on which our atomic future depends.

The Threat of Socialization

In view of that, it may well be asked who advocates such a program of large government reactors, and why.

Prominent among the advocates of large government-owned nuclear power plants are many of the same people who for years have been urging the government farther and farther into the electric utility business. In nuclear power, they see a once-in-a-lifetime opportunity to ensure the eventual complete socialization of America's electric power industry.

This process of socializing power has already gone so far as to be a matter of grave concern to thoughtful Americans. Twenty per cent of the electric power generating capacity in America today is government owned, and for years the trend has been toward an increasing proportion.

Those four out of five Americans who today receive their electric service from the investor-owned segment of the utility industry are discriminated against in favor of the 20 per cent minority who do not. The discrimination against the 80 per cent extends into the preferential disposal of power generated, the granting of licenses for new generating facilities, and the amount of taxes they pay into the government treasury through their electric bills. These taxes are largely avoided by the 20 per cent minority.

We are today engaged in a frightfully costly and bitter cold war with Russia over the conflicting philosophies of totalitarian versus democratic government. If we as a nation should allow ourselves to be betrayed into voluntarily abandoning along the way the very principles of free enterprise we are fighting to preserve, we shall indeed have defeated our own objectives by surrendering to the enemy.

What Americans Can Do

There are a few things that you and I and every American can do to help ensure that this country maintains its world lead in nuclear power yet does not become trapped in the pitfalls of government ownership.

First, we can keep ourselves informed. In the final analysis, the judgment of the American people will determine the course of our nuclear power program. It is absolutely essential that that judgment be an informed one, based on a full knowledge of the facts.

Second, we can learn to recognize the pitfalls along the way—the pitfalls that never fail to appear when government becomes involved in business enterprises. Socialized power already has a formidable foothold in this country. And it has quite a few adherents who will use any means that comes to hand to strengthen and extend it.

Third, we can be alert to the fallacies inherent in such catch-phrases as "cheap government power" or "public power." So-called public power is preferentially subsidized government power.

This power is the private domain of a privileged tax-exempt 20 per cent segment of the American public.

Fourth, we should consistently oppose any suggestion that this country's supremacy in atomic power cannot be maintained and extended within the framework of our free enterprise system. Our present supremacy was attained within that framework. We can maintain it on the same basis. The effort will be great, and it will require a great deal of assistance, financial and otherwise, from the government.

But it can be done.

Wisdom of Course Proven

The wisdom of our course has already been proven. Continuation of it will ensure our continued world leadership in atomic power, while preserving the basic principle of freedom to which our way of life is anchored.

IEC, What It Is and Hopes to Do

By Glenn S. Young

Manager, Power and Lighting Sales, Kansas City Power & Light Co.

An address before the National Industrial Electric Heating Conference, Cincinnati, Ohio, Feb. 6, 1958

THIS conference, one of the most important activities of the Industrial Electrification Council, is the result of the combined efforts of manufacturers and utilities; it is national in scope; it deals with an important market; it gives you information that you can pass on to the people in your area who need to know it and who are in position to put it to work.

And that, briefly, is what the Council was organized to do.

But let's take a look at the complete industrial electrification picture and at some of the obstacles that must be overcome.

Far too many men in management positions think of a production plant in terms of machine tools. Electrical wiring is considered a necessary expense instead of a means for economy and profit; lighting is considered as a means to overcome darkness instead of an efficient production tool; heat for processing is purchased on a btu basis instead of an overall cost basis. There are exceptions, of course, but certainly not enough to warrant too much boasting on our part.

But more startling are some predictions of what industry must prepare for in the decade of the Sixties to meet the demands of a population estimated to be 220 million people by 1970. The Gross National Product must be increased by 60 per cent over the 1956 figure. In simple everyday language, this means that our aggregate production plant must be equipped to produce 60 per cent more of the stuff we eat, wear, sleep in, ride in, and have fun with, plus the rest of the accessories that we think are necessary for our way of living.

Another disturbing prediction is that this 60 per cent increase in products will have to be turned out by a labor potential that will increase only 13 per cent on a manhour basis during the same period.

The necessity for future mechanization of production methods becomes most apparent. The output per manhour will have to be increased. Never in our industrial history has the importance of increased productivity been more emphasized than now. Production men are eager for new methods that increase the profit margin, lower the break-even point, and improve the competitive position of their firms.

Mechanization Is Answer

The obvious answer is more and more mechanization of industry. And more mechanization means more electrification because electric energy fits the picture better than any other form of energy. It is precise, every kilowatt hour has the same number of heat units. The flow of energy can be started or stopped, increased or decreated instantly and automatically. It is clean, quiet, and safe—an ideal energy for automatic production line jobs.

The electric industry has an obligation to its industrial customers in this program of electrification. This obligation is to keep its customers alerted to the benefits offered by modern production equipment, modern lighting and modern distribution systems.

Many millions of dollars per year are spent by the electric industry to tell the "do it electrically" story to our customers. Advertising in trade papers, direct mail, and personal contacts with individuals and groups comprise the basic methods of communicating ideas and information. It was in this area of communication that the need for an organization such as the Industrial Electrification Council became apparent—an organization through which all segments of the industry could benefit by presenting a more effective story to our industrial customers.

Operates Under EEI

The Council consists of both manufacturer and utility members operating under the sponsorship of the Edison Electric Institute. The organization structure includes an Executive Committee, Planning Committee, Steering Committee, and subcommittees for specific projects. At present there are two divisions. The Electric Heating Division, through a Steering Committee, directs the activities of two established subcommittees, the Metal Sheath Heating Committee and the Heat Processing Committee. This conference was handled by a Task Group, designated as the 1958 Conference Program Committee, operating under the Electric Heating Division. The Industrial Electric Power Distribution Division is presently operating through a Steering Committee. Additional Divisions will be formed when new fields of operation are undertaken.

One of the first projects undertaken by the Council was the establishment of the National Industrial Electric Heating Conference in 1954. Its quality and the attendance are ample evidence that the need existed and that the Council's action was justified.

The next project was the development of the Metal Sheath Electric Heater Course. I want to make an observation about it that has considerable to do with other course in the development and planning stages. I'm sure all of you agree that we learn faster and what we learn stays with us longer if we actually perform a given task, work a problem ourselves rather than hear someone tell about it, see a picture of it, or read about it. Thus one of the basic features of this course and those courses to come will include direct participation by the student in the working of problems—particularly those problems he is experiencing from day to day in his own plant. And when he is shown how to solve his problems electrically an important step has been taken in the electrification of industry. One instance may seem insignificant, but multiply it by several thousand and it makes an impressive total.

The Council chose electric heat for its first field of operation for two reasons—the large potential market in most all areas and the availability of

a tested customer course that could be adapted to the needs of most utilities.

Moving further into the field of electric heating, the Heat Processing Subcommittee is now working to develop a program on high temperature heat processing covering a wide range of industrial electric heating applications.

The Industrial Electric Power Distribution Division is well along on a program that can go far in helping to solve the problem of inadequate plant distribution systems. This is essentially a "grass roots" program to be carried on at the local level. It will consist primarily of an illustrated lecture-discussion and problem assignment type of course. Special emphasis will be given the assignment feature in that the participant will bring a problem from his own plant and follow through on its solution during the seven-session course.

Preliminary information indicates as many as 100 manufacturers of power distribution apparatus and equipment will join the utilities in support of this activity. The presentation at the local level of practical information on adequate plant distribution systems to the people who can put it to work, will be effective in relieving a condition that has existed too long.

Furthermore, this program is basic to the whole concept of mechanization and electrification of industry. If the forecast for 1970 becomes a reality, and it certainly seems to be headed in that direction the industrial use of electric energy for manufacturing purposes is forecast to double the 1956 use. Certainly existing plant distribution systems will have to be expanded or rebuilt in proportion.

This points up another very obvious fact that had a great deal to do with the origin and development of the Industrial Electrification Council. So far as the utility is concerned, it cannot sell its product until the utilization equipment is in place and connected. Consequently, it is very much interested in any program that will speed up customer acceptance of a new idea and shorten the time lag between planting the idea and closing the sale.

Furthermore, there is less sales resistance to new equipment if the plant distribution system is adequate to handle the new load. And by adequate we mean more than just ample current carrying capacity. It should have a flexibility feature that permits changes in equipment locations, and the addition of new equipment with only minor system changes.

What of the future—what does the IEC "hope to do?"

It is important that these conferences continue particularly for the new salesmen coming into the industry and, as a refresher course for experienced salesmen. Furthermore, new heating equipment and new heating processes are continuing to be developed—particularly is this true as electric heat takes over the job from its fuel competition. Perhaps the task committee on the next conference should review the time interval between conferences with respect to the number of new men in the field and the new developments in equipment and processes.

Heater Course Vital to Program

The Metal Sheath Heater Course is very basic to our entire industrial electric heating program. We all know of large heating installations that were spawned by a customer's experience with a small electric heating unit. The use of this course must be expanded to reach many more industrial customers. We must be alert to revising it to meet changing conditions or by tailoring it to fit the needs of more utility service areas.

We hope to develop additional programs on the many large electric heating applications—programs you can take to your customers on a group presentation basis. This is a more difficult job because of the lesser number of potential applications and the variation of the type and number of manufacturers in various utility areas. Moreover, the applications become more technical in nature involving the metallurgical and chemical, as well as the electrical fields. The program needs to be tailored to fit the needs of both the utility and its customers. The committee is working on it and will come up with a satisfactory solution.

The Industrial Electric Power Distribution Program is on its way. It should be ready for distribution in the fall (1958). It should provide a much needed impetus towards relieving the bottleneck of obsolete and inadequate industrial plant wiring.

Future programs of the Council must be geared to needs of our customers.

We referred earlier to a prediction that industry's use of electric energy would increase over 100 per cent in the next decade and at the same time the available manhours of labor would increase about 13 per cent. This discrepancy must be equalized by highly mechanized machines powered and controlled by electric energy. Some of the available manpower must be upgraded in their skills in order to understand and operate the machines. A source of basic knowledge of the principals of electric controls and control systems should be of distinct benefit to industrial plant personnel and to management. This could become an important Council activity.

Furthermore, the problem of maintenance and servicing these highly mechanized plants will increase. A somewhat parallel situation is now acute in the residential appliance field. It not only is affecting the sale of appliances, but, in some cases, electric appliances are being replaced with competitive methods.

The situation recently received unfavorable national publicity by a newspaper columnist who had had personal experience with it. Her comment was, "There is close to a breakdown in appliance service in our country today." The electric industry recognizes the problem and is taking steps to correct it.

It can happen in the industrial field. Interruptions due to equipment and distribution system failures are expensive, particularly so in highly mechanized plants.

Therefore, it seems appropriate that the electric industry should review its preventive maintenance programs in the light of future industrial plant requirements. It is a large field now and growing larger at a rapid pace. It is also a field in which all branches of the electric industry can cooperate to keep industrial electrification working full time. It, too, could be an added activity of the IEC.

I am sure that the men who conceived the idea for the Council and worked diligently to get it started can take justifiable pride in its accomplishments. It has done much to stimulate the market for electric heat. It has brought about a closer working relationship between manufacturers' representatives and power salesmen. You can be sure that it will continue to expand and be effective in additional areas wherein group action can speed up electrification of industry.

Our Experience with the Metal Sheath Electric Heater Course

By Robert R. Johnson

Manager, Industrial Sales, Duquesne Light Co.

Presented before the National Industrial Electric Heating Conference, Cincinnati, Ohio, Feb. 6, 1958

THE Duquesne Light Co. is one of approximately 40 utility companies throughout the United States which has made use of the Industrial Electrification Council's material designed to teach industrial personnel the fundamentals of applying metal sheath electric heating. Our modest experience with this group selling effort in the Pittsburgh area may be of interest to those who are toying with the idea of giving it a whirl or to those who would like additional confirmation of their own achievements.

Duquesne heartily approves of group selling as an economical, efficient and effective way of obtaining industrial business and endorses the Metal Sheath Electric Heating Course as one of the available packaged group selling vehicles that begin to earn good dividends right away. We do not consider ourselves an authority on the subject. However, if we have been able to achieve some degree of success along this line, we gladly pass it along.

Serves 1000-Square-Mile Area

The Duquesne Light Co. serves largely a metropolitan area of about 1000 square miles consisting of the City of Pittsburgh, its suburbs and contiguous neighborhoods in Allegheny and Beaver Counties. Our territory is compact and densely populated with industries along the banks of the Youghiogheny, the Monongahela, the Allegheny, the Ohio and Beaver Rivers. Its highest one-hour integrated peak load in 1957 was approximately 1120 megawatts. The industrial market of Duquesne consists essentially of about 1500 concerns that either manufacture or process something. Of these 1500 customers, about 700 have demands of 50 kva or less. Four hundred and fifty fall between 50 and 200 kva and 350 have demands between 200 kva and 90,000 kva. At present there are two customers with single connections having demands of 90,000 kva each in which substantial expansion is expected in the next two years.

To Sell Smaller Customers

In the past, like most other electric utilities, emphasis has been on direct selling to this group of customers primarily with demands above 20 kva. Our definition of direct selling is "the making of personal calls by a salesman on an assigned group of customers to encourage increased use of our electric service." You are probably all aware of the fact that this type of selling cannot adequately cover the small customers where small but consistent growth is taking place. In the past several years this condition has made us conclude that some other sales effort must be devised to satisfactorily cover this group.

For many years Duquesne has carried on a sales promotion activity slanted primarily toward helping the salesman by preparing his customers, through the printed word, to extend a receptive attitude toward his direct selling efforts. However, we have long felt that we are not adequately covering the 700 customers under 50 kva of demand and probably not using the most efficient methods in selling to this group or those somewhat larger.

Best Method of Selling

It has been our conclusion that the best method of selling this group is through expanded sales promotion and group selling activities. The customer training courses such as the Westinghouse and Len Fries' Industrial Lighting Courses, the Industrial Electrification Council's Metal Sheath Electric Heating Course and others which are already in use, as well as those now being designed, offer an excellent opportunity to reach that group of cussomers as well as some of the larger ones through a sales technique designed to *make sales* as well as promote them.

It is with the Metal Sheath Electric Heating Course that we are concerned at this time. We have successfully presented it to almost 400 representatives of our industrial customers and we are happy to present to you our experiences and the results which we have obtained. We have conducted six of these Workshops since we first subscribed for the Industrial Electrification Council's material in January, 1955. One of the six was conducted in two sections with meetings on successive nights due to the large turnout, so perhaps it would be more accurate to say we actually held seven in all.

Our first effort was held at the McKeesport Vocational High School Cafeteria, which community is located in a heavy industrial district about 20 miles from downtown Pittsburgh. Ten of our Industrial Salesmen attended this first series of meetings. Since that time all of them have taken the course and now they participate in the meetings.

Short Notice Cuts Group

Our second Workshop was held in a public school building at Beaver Falls. It was the smallest group partly because we held it on too short notice. Unless you want to stop all other activities, plenty of time should always be allowed to secure adequate attendance and handle the many other details involved.

We conducted our third series in two sections on alternate evenings because the crowd was too large for the effective use of demonstrations. The employees' cafeteria for our Substations and Shops personnel was used for this series of meetings.

The turnout for the fourth series was greater than expected. We tried to divide the group into two sections

TABLE I—DUQUESNE LIGHT CO. METAL SHEATH ELECTRIC HEATING WORKSHOPS

Date	*Place*	*Enrollment*	*Average Attendance*
Jan. 1955	McKeesport	47	40
Mar. 1955	Beaver Falls	25	21
Oct. 1955	Manchester (Two Sections)	89	71
Feb. 1956	Manchester	86	78
Feb. 1957	Edwin L. Wiegand Co.	48	37
Sept. 1957	McKeesport	77	62
Totals		372	309

but practically no one wanted to come on another night. Our Substations and Shops Cafeteria, which is centrally located, was again used as the meeting place.

Meeting Held at Wiegand Co.

Another meeting was held in the attractive conference room of the Edwin L. Wiegand Co. A prodigious amount of electric heating devices and units produced by Wiegands, one of our very fine sales allies, was attractively displayed.

After about two and a half years we played a return engagement at McKeesport where we made our first stand. It was a sizable group of different people who turned out for the same show that had been put on at the same place exactly two and a half years previously. There was one exception, the electrical superintendent of a large manufacturing concern was a faithful participant at both schools. It might be of interest to find out why he attended both.

Our eighth course since January, 1955 started on Feb. 17 at the Ambridge High School, about 15 miles down the river from Pittsburgh. This is the first time we have put the course on in Ambridge so we expect a representative enrollment. Like the others, it is being held in the school cafeteria and the course is being conducted very similar to the others. We have made a few changes in the routine of presenting the course and we are quite impatient to determine if we have made an overall improvement.

Effect of Rotating Shifts

There are numerous factors responsible for the fall-off in attendance of any adult educational effort. In the Pittsburgh District, which is largely a steel-making and fabricating area, the idea of rotating shifts is generally practiced. This adversely affects attendance figures. The average attendance at our seven Workshops was 83 per cent of enrollment.

We would like to know more about maintaining good attendance at our meetings. We know one way it shouldn't be tried. For a number of reasons, we ask for the student's home address when he registers. Once we got the idea that it would be nice to drop a card to the fellows who didn't attend the previous session to let them know we missed them. Two fellows came foward at the next meeting and announced that we had fouled things up for them at home because their wives had read the cards and thereby discovered they had played hookey. We never did that again.

Keeping Attendance Up

How does one encourage or secure adequate attendance at meetings?

Probably no two utility companies go about it in exactly the same way or with the same degree of success. I suppose almost any legitimate method short of a court order could be and sometimes is used. We, at Duquesne, have secured a rather satisfactory attendance at most of our meetings largely through publicity methods combined with some direct help from our power salesmen. In the early stages of our group selling work, we would not have secured a "corporal's guard" for our meetings were it not for the very vigorous help of our salesmen. As time passed and knowledge of the character of our group educational efforts became more widely disseminated, satisfactory attendance was less difficult to secure.

I believe that if you intend to conduct a group selling activity, it is desirable to divorce it as much as possible from the direct selling activity in order to save the time of the industrial salesman. This does not mean that they should not try to sell the program on their scheduled calls. However, it does not seem desirable to take the salesmen off of their regular work in order to build attendance at the group selling Workshops as we had to do in the beginning. We do like the salesmen to attend as many of the meetings as they can in order to become better acquainted with any of their customers who might be attending and to pick up prospects for their personal calls.

We sent material to about 350 executives and key operating personnel of industries in the McKeesport area to solicit attendance at a Metal Sheath Electric Heating Workshop we conducted in that community last fall. Seventy-seven persons who we look upon as buying influences or who are on the way to becoming buying influences, enrolled for this series of meetings.

Letter of Invitation

This material consisted of a letter of invitation that announced the projected Workshop and recommended it. It also included a rather professional looking five-page brochure that described the Workshop in some detail and gave an impressive list of companies that had been represented at previous ones. A self-addressed government post card was enclosed on which the customer was asked only for a guess to the number of persons who would attend from his company.

If a customer is asked initially to give the names of persons he intends to enroll at a particular series of meetings, he must decide not only on the merits of sending anyone at all but must decide which of a number of possible candidates he should select. Since deciding anything requires mental exertion, the customer is inclined to shelve the matter. This shelving business hastens the growth of ulcers on the part of our group selling personnel.

First an Estimate

It has been our limited experience that it is better to ask the customer for a guess which will allow preliminary arrangements to be made and, after a reasonable time has elapsed, follow up the first notice with a short letter and business reply card requesting specific pre-registrations. Of course the salesmen are advised about the forthcoming meeting and can answer customer's questions and generally give it an assist whenever the opportunity occurs. Quality and distribution of enrollees should be sought rather than large numbers from a relatively few large industries.

Neighborhood newspapers are also effective in securing attendance. Generally they are willing to give the meeting announcement a generous amount of space and treat it as a news item or community service rather than as a paid advertisement. It is important that the newspaper be advised as to the specific classification of persons whose attendance is solicited. We have *not* been successful in securing this kind of cooperation from the large city newspapers.

Newspaper Stories Invaluable

A full-page writeup was made by the McKeesport *Daily News*, which had previously carried a news item announcing the Metal Sheath Electric Heating Workshop scheduled for that area. The pictures and story were obtained at the first meeting. This full-page spread had the effect of telling its many readers that the Workshop was well attended and that it was a serious effort to impart useful information to men in industry. This type of publicity is invaluable in arranging repeat performances in the district and also quite helpful in securing press releases in other districts.

Meetings should be well organized and conducted in a professional manner. The leader should not only be seasoned and capable, but should also look and act the part. He should be especially trained in the subject material and skilled in the methods and techniques applicable to adult education. Remember that you can't scold, expel, write home about, or flunk your students. Whatever is said or done should impart useful information, make friends, recruit industrial operatives or salesmen in the industries represented and build a favorable reputation which will make it easier to recruit industrial people for subsequent meetings and workshops.

Leader Fully Prepared

For the leader, we employed the services of an electrical engineering instructor from one of our local universities. We sent him to a plant where electric heating devices are made to give him a one-day briefing; set up and conducted for him all of the demonstrations involved; told him what we were trying to accomplish and handed him a Student Text and the Instructor's Manual. His helper was usually recruited from the Industrial Sales personnel in the district where the meetings were to be held. The helper, who had previously taken the course, was also required to conduct all the demonstrations prior to the beginning of the series of meetings.

The reason we employed an instructor for these meetings was simply a matter of manpower. We have in our organization men who are capable of taking over this assignment and, as a matter of fact, we used them for this purpose in the beginning. However, we found that the preparation consumed so much of their time that their other duties suffered. It was after this experience that we decided to hire an instructor to whom we pay an agreed fee for each session of the course rather than put a man permanently on the payroll. This has worked out very satisfactorily for us.

Regarding meeting places, it has been our practice to use as frequently as possible, the cafeterias of neighborhood school buildings. These areas have chairs, tables that can be used as desks, available janitor service, facilities for serving a snack, and generally the rental is reasonable. In this respect, we have found it more desirable to hold these meetings in outlying districts rather than in downtown Pittsburgh.

While we have been successful in securing a crowd for one-day forums in downtown Pittsburgh, for some reason or other our customers do not like to come downtown for night meetings. At one of our downtown series of meetings, we notified our guests that parking had been arranged at one of the garages and it seemed to us that this had some influence in building a larger attendance. However, as of now we are continuing the practice of holding the Metal Sheath Electric Heating Courses in outlying districts and it appears to us as though this is the better arrangement.

Two quizzes were given during each course. The first, a 10-question one dealing mostly with definitions and other fundamentals, was handed out at the end of the third session. The second, consisting of 20 somewhat more involved questions, was handed out at the end of the fifth session. In both instances, these questions were answered by the students outside of class. The leader ran through the questions quickly at the beginning of each subsequent session. These quizzes encouraged mental exertion and hence learning on the part of those who attended. They also served as a measure of how well the leader's smoke signals came through. Everyone who turned in his quiz paper became eligible to draw for several valuable prizes, usually an electric space heater. Participation in these quizzes was high.

Questionnaire Brings Praise

Every endeavor, regardless of how carefully planned and executed, has its shortcomings as well as its good points. A questionnaire was mailed to all of those who participated in these Electric Heating Workshops to obtain information that would serve as an indication of their effectiveness. This questionnaire sought, among other things, the student's frank appraisal. Constructive criticism was encouraged. Most of the returns contained nothing but high praise. Typical of the complimentary remarks were as follows:

1. Very interesting and conducted very smoothly.
2. Very satisfactory.
3. Was very favorably impressed.
4. Instruction was very good. I learned a lot about electric heating.
5. Instruction very well put across.
6. Very well planned and presented.
7. Covered the subject adequately.
8. Also enjoyed the sociability during snack period.
9. Want to compliment your company on a very fine and informative series of meetings.
10. Instruction handled well and moved along just fast enough to hold attention.

Frank Criticism Given

Other questionnaires contained some frank constructive criticism such as these:

1. More technical information, less advertising.
2. Six two-hour sessions not enough time.
3. Too much time spent by leader on detailed calculations, not enough on fundamental theory.
4. More classroom problems and class participation.
5. More homework to help make instruction stick.
6. Limit size of groups to 40 members.
7. Include more on infrared.

8. Include more on handling and maintenance of heating equipment and controls.

9. Should visit and inspect actual installations.

10. Cover less ground more thoroughly.

Some Criticisms Adopted

Some of these criticisms appear to us to be worthy of adoption and we have made some changes in our teaching procedure to include them. For instance, our Feb. 17 course contained seven sessions instead of six. We will either restrict the enrollment to possibly not more than 40 or we will use a public address system. Some of the suggestions are a matter of opinion and may or may not be used.

It is our practice to collect a $5.00 registration fee from each enrollee in the course. I think this is a generally accepted practice although I have observed a wide difference in the amount of the registration fee. I have been told of those who charge only $3.00 while others charge as high as $10.00. The theory back of charging a registration fee is that it gives value to the course, thereby impressing the enrollee that he must get something out of the course in order to compensate him for his time and expense. A $10.00 registration fee appears to be a more realistic figure as that is approximately the out-of-pocket cost per registrant for conducting the course.

Cost of the Course

It might be of interest to you to see how the out-of-pocket expense to conduct one of these courses is distributed between the numerous items involved. This itemization of cost applies to the September, 1957, course at McKeesport in which we had a registration of 77 students.

This, of course, does not include the original cost of the kit or any portion of the wages of Duquesne Light Co. personnel or the materials such as stationery, stamps, and other company supplies which were used.

The casual observer probably does not realize just how much constructive work went into this Industrial Electrification Council text and demonstration material. We would like to observe, however, by way of constructive criticism that the development of slides should be done according to established principles of visual presentation.

TABLE II—OUT-OF-POCKET COST FOR CONDUCTING THE MCKEESPORT COURSE

1. Wages of Instructor	$180.00	
2. Wages for material handling including janitor service	105.00	
3. Trucking labor	41.08	
4. Wages of cafeteria worker	42.00	
5. Wages of registration clerk	10.00	
6. Publicity material and mail service	130.00	
7. Textbooks	154.00	
8. Food for snacks	72.57	
9. Rental of space	24.00	
10. Prizes	55.62	
11. Miscellaneous expenses	18.78	$833.05
Registration fees $5.00 x 77		385.00
Total net outlay		$448.05
Net outlay per registrant		$ 5.82

It was necessary for us to revise most of the 120 slides that came with the course before we could use them for meetings of the size we generally hold. The alterations consisted mostly of enlarging the diagrams and printing. Then again, teaching methods are always undergoing changes and it is hoped that they are getting better. Accordingly, anything that can be done in the future to develop effective group selling material that will require a minimum of physical effort to handle, will be more acceptable to the growing number of utility companies that are suffering from an increasing shortage of manpower.

Finally, and perhaps the greatest importance is the question, "Is the Metal Sheath Electric Heating Workshop an effective and economical selling tool?" We took definite steps to answer this question and our answer is yes. Even if it merely moved a reasonable number of buying influences from the stage of unenlightment, indifference or downright opposition to electric heating, a few substantial strides toward becoming satisfactory users, the effort would be economically justifiable.

I say this because all of us are keenly aware of the growing cost of fielding a team of good sales representatives. Any spade work, therefore, that can be done to condition the prospect for our salesmen, generally amounts to time and effort well spent. Furthermore, our study convinced us that the Metal Sheath Electric Heating Course can sell load by its own effort.

The questionnaire we sent to all participants of these courses contained, among others, the following question. "Have you or your company used the information presented to help you figure an electric heating job or to install any electric heating equipment? Please state the kilowatt rating of the equipment involved and the nature of the application, if you are at liberty to do so. Did the electric heating installation perform as you figured it would?"

Revenue Rewarding

A total of 867 kw of metal sheath electric heating load was reported by those who returned their questionnaires, as having been installed. If a load factor of 20 per cent and a net rate of 1½c per kwhr were assumed for the purpose of a quick horseback estimate, this new load would result in a revenue of $20,000 a year. No matter how you look at it, this revenue isn't half bad for a total of 77 hours of teaching work.

While we believe the Metal Sheath Electric Heating Course is not only an excellent sales promotion and group selling device, we also believe that it can be improved and possibly the time for improvement is now.

The West Penn Power Co. deserves a great deal of credit for giving this course to the industry when it was needed most and without the delay of designing and fabricating it from the ground up. However, in its present form it appears at times to be cumbersome and difficult to set up and take down with minimum personnel. It is our opinion that a revision of the course at this time by the Steering Committee of the Industrial Electrification Council would be in order but still retaining the material in the basic course which is good. We believe some things could be done which would simplify it and make it easier for minimum personnel to handle.

Too Much Heavy Material

It is our belief that there is too much heavy display material which must be transported to and from the meeting place and set up and taken down before and after the sessions, one night a week for six or seven

(*Continued on page* 54)

Expansion and Modernization of the Frank M. Tait Generating Station, The Dayton Power and Light Co.

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Presented before the EEI Electrical System and Equipment Committee, Dayon, Ohio, Feb. 11, 1958

THE Frank M. Tait Station is located on the Miami River, at the southern edge of the City of Dayton. It had its beginning in 1916, when two 12.5 megawatt units were installed. Tradition had it that predictions were made that "these units will serve the community's needs for many years." However, a gratifying experience of a doubling of the load every 10 years resulted in the addition of more and larger units.

At the close of World War II the installed capacity had reached 220 mw. Included in this figure were low pressure boilers and turbo-generators totalling 70 mw, some of which had been installed as early as 1922.

The modern portion of the station consists of four high-pressure boilers, two topping units discharging into three low-pressure machines, 150 mw total. Because of its proximity to industrial customers, as well as to downtown Dayton, a substantial part of the output of the station has always been fed directly into the distribution system at the generation voltage of 12,000 volts. Transmission beyond the station is at 69,000 volts.

O. H. Hutchings Station

This station is located on the Miami River, about 10 miles downstream from Tait Station. The two stations, with Tait at its pre-expansion capacity, were utilizing the concentrated and readily-available condensing water within our service area. The first unit at Hutchings Station went into service in 1948. One unit added each year brought the station to completion with six units, having a nameplate capability of 360 mw. No further expansion is presently feasible, because of water and design limitations.

By 1954, with 580 mw of installed capacity; a load which had reached a peak of 433 mw, and was keeping up its rate of growth, planning activity was intensified, to decide upon the next move.

The Planning Stage

Two courses were open to us, either to replace older units at Tait Station and postpone the construction of a new plant, or to develop the third station at a new site, postponing the modernization of Tait Station until a later date.

The greatest deterrent appeared to be that we would be obliged to remove from service 70 mw of capacity and raze the low-pressure boiler plant before the construction of an addition could be started. Space limitations and the physical layout prevented any other course. It would then be necessary to start at least a year earlier, so that the loss of 70 mw could be regained in time to meet load growth needs. As a matter of fact the economies actually came out very close. The decision to proceed with the Tait reconstruction was then overwhelmingly influenced by other considerations.

Tait Station could be expanded along contemporary design principles, allowing more time to use advancing designs at a third plant—super steam pressures; higher temperatures; and even the ultimate use of other forms of fuel. Since Tait Station is near our load center, existing lines could be augmented readily and with relatively small investments, to take a greater load. Our entry into the field of 230- or 345-kv transmission could also be postponed.

The 70 mw of capacity which had long passed its peak of economy, would suffer continuing deterioration and high maintenance. Coal handling facilities were inefficient and well worn. The installation of a modern coal handling system, including a thawing shed, car dumper, conveyors and storage could only proceed as plant expansion was undertaken. Smoke abatement could be realized with the old low-pressure boilers only by extraordinary expenditures, of brief usefulness.

The proximity to Dayton made the matter of cinders an acute problem. An expansion program would give an opportunity to eliminate congested and hazardous control cable installations. For the most part the original control cables were still in use. The dire potentialities of a fire were a constant source of concern.

At Tait we had a site, which although cramped, was already developed. A minimum addition to operating personnel would be required. The decision was reached to proceed with the installation at Tait Station.

The Modernization Program—Electric

Two 130-mw turbo generators are being installed, each with its three-phase 170-mva step-up transformer, the one connecting to our East 69-kv Substation; the other to the West Substation. Aluminum isolated phase bus is used between the generator and the transformer. Welded connections were used between sections. Welds were made in the factory wherever possible. The balance were made in the field by a factory-trained welder. Each generator has its own 12 mva auxiliary transformer. A third 12-mva start-up transformer is supplied from our existing 12-kv distribution bus. Auxiliary power is supplied at 4000 and 460 volts.

The increase in short circuit values at the station rendered inadequate the existing 69-kv and 12-kv oil circuit breakers. The 69-kv buses were strengthened by replacing two-inch double extra-heavy copper tubes with three-inch extra heavy. The substitution of 1200-ampere live parts for 600-ampere gave the needed strength to disconnecting switches. New 3500-mva, 69-kv oil circuit breakers were installed. Fortunately all of the breakers removed could be used at more remote points on our transmission system.

Electrical Galleries Cause Concern

The electrical galleries have been a source of particular concern to us. Our main generator and bus-tie breakers, as well as the feeder breakers, have been revamped throughout the years, taking advantage of advances in the art, to increase their interrupting ability. However, it could still be expected that they would throw oil under stress, and some of them were being subjected to short circuit capabilities beyond ratings which we feared were somewhat inflated.

Current limiting reactors on many 12-kv feeders were of the vintage of 30 years ago and a number had failed. The original buses, with masonry isolation between phases, were replaced in 1937 with metal-enclosed buses, but concrete cells were still containing the oil circuit breakers. The main 12-kv oil circuit breakers were replaced with air blast breakers, having an interrupting rating of 1500 mva. The 12-kv distribution feeder oil circuit breakers are being replaced with 750-mva air circuit breakers, which had just become available in this rating. Space limitations in our switch house required the utmost cooperation with the manufacturers to permit moving new breakers through the aisles and fitting them in place.

Installation of the new breakers was carried out without mishap and without disrupting our normal power delivery.

A by-product of the installation of new 12-kv feeder breakers will be that we can apply adequate neutral grounding, to preclude elevated potentials on the distribution system under certain fault conditions.

We have one electrical control room at Tait Station. The operators there have control over all generators, the 12-kv main and feeder breakers, as well as two 69-kv switching stations.

At the start of our expansion program we were faced with the situation of having an already crowded room. Control cables radiating from the switchboards passed through areas which can best be described as tangle-boxes. Isolation to safeguard against spreading fires was non-existent. It could be hoped that the insulation on older control cables could be relied upon only so long as the cable was not disturbed by moving it.

Inasmuch as no equally satisfactory central location could be found for relocating our control room, we have completely revamped it. All new switchboards have now been installed and all old control cables have been replaced. Cable pans have been tailor-made to afford the maximum separation between those serving the various machines and buses. The handicap of operating for more than a year with temporary sections of switchboards, while cutovers were in progress, did not result in a single mishap of any consequence.

All the present generators in the topping plant are feeding onto the 12-kv bus. We studied the possibility of connecting the two 170-mw machines to the 12-kv bus. We were deterred by the fact that the current carrying and interrupting rating of available 12-kv breakers would force us into unduly complicated connections and even greater space problems. Other alternatives such as two windings on the generator were also rejected in the interest of the simplicity of connecting them to the 69-kv bus.

We have installed regulating transformers between our 69-kv and 12-kv buses, for these reasons: Our 12-kv bus voltage is critical because we supply better than 100-mw load directly from this bus, without any feeder regulators. Yet the old generators directly connected to this bus shall be our less efficient units and will be on and off as the system load dictates. Reactive power flow through the 69-12-kv tie transformer banks will change direction with varying loads and generation. Fixed taps on these transformers are wholly inadequate to permit the needed flexibility.

Major Equipment Installed

Generator: GE, 173,000 kva, 16,000 volt, .85 pf, .60 scr., 30# h_2, 3600 rpm.

Main Transformer: GE, 170,000 kva, 15,200-69,000 volt, Δ-Y, Type FOA-T.

Auxiliary Transformer: GE, 12,000 kva, 15,200-4160 volt, Δ-Y, Type OA-T.

Bus Duct: GE, 6500 ampere, 16,000 volt, aluminum conductor, welded.

Auxiliary Switchgear: GE, metal clad, Type AM-2.4/4.16-150/250 breakers, 1200 ampere, 250 mva.

12-kv Main Breakers: GE, air blast, Type ARB-14.4-1500, 2000 ampere, 1500 mva Westinghouse air blast type 150-CA-1500, 2000 ampere, 1500 mva.

12-kv Feeder Breakers: Westinghouse Type 150-DH-750, 1200 ampere, 750 mva.

The Boilers and Mechanical Plant

With a spirit of pioneering that has been shown in the past, we have purchased the first once-through boiler to be used at conventional pressures by any electric utility in the United States. This once-through type boiler is the outstanding feature of this modernization and expansion program at the Frank M. Tait Station.

The boiler is designed to deliver 940,000 pounds of steam per hour to the turbine throttle at 2400 psig, 1050° F. with reheat to 1000° F.

The water and steam paths for the once-through type steam generator differ from those in the conventional unit in that the feedwater flows from the economizer to the monotube evaporative section, where all but 4 per cent of the water is converted to steam. This mixture of steam and water passes to the boiler water separator, where the residual water is removed. In this way the separator controls the condition of the steam entering the superheater so that it is dry and saturated.

An automatic oil hydraulic control system in Europe by Sulzer Bros. will control feedwater flow, regulate primary steam temperature, and operate the turbine bypass system. This latter system provides desired characteristics for starting from a cold condition; for a hot quick restart; and protection of the unit in abnormal operating situations. Boiler feed is supplied by two half-size boiler feed pumps for each of Units 4 and 5. The pump has ten stages, with a capacity of 1165 gpm at 3600 psi, and is driven by a 3500-hp motor operating at a speed of 3600 rpm.

The high purity requirements of make-up water for our monotube boiler installation and other once-

through type boilers have brought about considerable investigation of the evaporator versus demineralizer issue. In our case the simplicity of operation and the maintenance of desired chemical conditions in the feedwater cycle were major considerations in our selection of an evaporator. To be just a bit more specific on these points, the specified requirement of the make-up water purity is 0.5 ppm total solids; the evaporator purchased for this job has been guaranteed to produce water of 0.25 ppm total solids and, by analysis, an evaporator in our system is now producing water approaching this quality. Silica concentrations (which are vitally important when considering the turbine) in our evaporator vapor are lower than generally reported for demineralizing installations.

A heat reclaimer coil is installed in the breeching to recover part of the heat in the flue gas leaving the air heater and adding it to the air leaving the forced draft fan ahead of the main air heater. This is done in order to maintain a minimum average of 200° F. between the gas and air temperature at the cold end of the air heater to prevent acid formation in the flue gas, which would be detrimental to the air heater. As a result of this heat reclamation, the exit flue gas temperature to the stack will be reduced from 300° F. to 250° F., which should improve the plant efficiency. This type heat reclaimer replaces the steam coil, drawing its steam from the cycle, which is normally used to prevent acid formation in the air heater.

Two Fans for Air, Gas Flow

Due to the size of the unit and other design factors, the air and gas flows are handled by two fans. Both the forced and induced draft fans are of the airfoil blade design. This design was chosen to take advantage of the 10 per cent higher efficiency offered by the airfoil design over the backwardly curved blade design. The airfoil design has been used quite extensively for forced draft fans; however, there are few airfoil type induced draft fans in operation as yet, due to the lack of development of a blade of this design that would resist erosion. The blades on our induced draft fans are equipped with a removable cast iron nose piece. We do not anticipate erosion difficulties as long as our collection efficiency is maintained near the guaranteed figure.

The dust collecters which will provide the collection efficiency are combination mechanical and electrostatic, with a collection efficiency of 97.5 per cent, and are equipped with three half size mechanical rectifiers.

The condenser on this job is an Allis-Chalmers two-pass surface type with 90,000 square feet cooling surface, requiring 80,000 gpm of condensing water.

Miles of Condensor Tubing

The condenser contains 11,550 tubes, one inch O.D. and 30 feet long, totaling over 62 miles of tubing. Since the one-through type boilers require the purest of condensate, no leakage can be tolerated in the condenser; therefore, in an effort to maintain the highest condensate purity possible, we chose to weld the condenser tubes to the tube sheet; a procedure which has been under discussion and test for some time, but so far untried on an actual condenser. As a result, Unit #4 has the first welded tube condenser. To prevent ammonia attack on the tubes in the air removal section of the condenser, that section (consisting of 660 tubes) will be furnished with 304 stainless steel tubes instead of the Arsenical Admiralty tubes used in the balance of the condenser.

The fire protection system in the new plant consists of numerous fire hose cabinets located at all strategic locations and located for full coverage.

These fire hoses are supplied by a fire pump whose suction is in the discharge tunnel and the pump starts automatically with a flow in any of the standpipe lines.

The coal handling system is protected by a completely automatic sprinkler system of its own, consisting of a combined nozzle and spray system covering the feeder house, crusher house, and all of the conveyors.

The fire protection layout for the turbo-generator unit is divided into four individual systems, three Fire-Fog systems, and one dry chemical system. The three Fire-Fog systems cover the area around the head end of the turbine, the turbine oil reservoir, and the seal oil unit. Each of these systems has its own alarm, based on rate of rise, with the deluge valves being tripped by hand. The fixed dry chemical system covers turbine bearings No. 1 and No. 2 and operates as an automatic system.

A completely new coal handling system is installed to convey and elevate coal received by rail and unloaded by means of a new car dumper to serve both the existing and new units.

The 800-ton-per-hour coal handling system consists of receiving hoppers, crushers, samplers, stacking out conveyor to ground storage area, and a motor-propelled automatic tripper. The system also includes a coal scale for each mill and a gas-fired, car-thawing shed which can accommodate eight cars for thawing at one time. Since the coal handling system supplies coal to the old plant as well as the new, it was necessary to provide a variable rate of feed; as an example, 300 tph is required for the old bunkers, 800 tph to the new bunkers, and 400 tph to the stacking out conveyor. To accomplish this, an automatic feeder control device is used to control the rate of coal fed on to the conveyor. The rate of feed is maintained at whatever setting is selected. This is accomplished by the use of a beltmeter which is a section of the belt that operates as a scale and controls the rate of feed to maintain the desired capacity.

The ash handling system in the old plant was revamped to accommodate the top and bottom ash from the two new boilers.

By revamping the piping and control panels and by the addition of interlocks and switches, the same control boards, though relocated, will be able to handle the ash from the two new boilers as well as the four existing ones in a system as completely automatic as is practical.

Automatic Temperature Recordings

To further improve operations in the old plant, all of the boiler fan and fan motor bearings whose temperatures were checked hourly were equipped with thermocouples and the temperatures are now recorded once every ten minutes in the existing mechanical control room.

Mill air temperature dampers are now controlled automatically instead of manually as before; and the soot blowers on the old boilers were changed from hand operated steam blowing soot blowers to automatic air

blowing soot blowers, controlled from the existing mechanical control room, using air supplied from the new soot blowing air compressors being installed with Units 4 and 5.

The relocation of the ash handling control, along with the modernization of the system to accommodate the new units, and the overall automation added to the old plant permits a more efficient use of operating manpower, and it is our hope that the addition of this equipment will release enough manpower from the old plant that few, if any, additional men will be needed to operate the new units.

Civil Engineering

The civil engineers have faced some very interesting and challenging problems in the reconstruction and additions to the Frank M. Tait Station for Units 4 and 5. Among them have been the relatively small site, the additions to the water intake structures, the alterations to the water discharge tunnels and the general structural design of the new structures.

The site for the station contains 28.23 acres. This is a relatively small site for a station of this capacity. Included on the site are the usual station structures, including coal storage for 150,000 tons and elevated railroad sidings on earth fill for four tracks about 1600 feet long. Due to the very small area available around the main station building, it has been necessary to compress the construction activities and storage of construction materials into a very small space. This has made it necessary to schedule the shipments of material so that they will arrive as they can be used by the construction forces.

Rail Siding Facilities

The new rail siding facilities have been developed on an earth fill about 17 feet above the original grade and 1600 feet long, containing 250,000 cubic yards. This fill was placed during the construction of the new service building in 1955, thus it had a considerable period in which to settle. These tracks were elevated in order to bring them up to the grade of the main line of the New York Central railroad and reduce the depth which had to be excavated in order to get the hopper under the car dumper.

Fortunately, the site is located on a glacial fill of sand and gravel which provides an excellent foundation material and a reasonably good underground water supply for any wells.

The plan as adopted for the installation of Units 4 and 5 required the removal of three turbines and the floor surrounding them, the removal of five boilers and that portion of the boiler room occupied by them, including the foundations. This is the third major remodeling of the station so there is very little remaining of the original structure in the boiler room. The turbine room has been maintained in its original design and has been lengthened. The electric gallery is occupying the original structure but the equipment is quite different from that originally installed. We have removed the original screen house which was an isolated structure at the entrance to the intake tunnel and contained two traveling screens.

As a part of the project, in addition to the installation of the structures for the turbines, boilers and associated equipment, we are constructing a new service building section to house offices and various plant personnel, a first aid room, the electric maintenance shop, a blue print and record room, a light storage room for active supplies and a general machine shop. Included in this area is a 20,000 pound capacity elevator traveling from the basement or machine shop level to the turbine room floor. A welding shop is beng provided in the basement of the #5 boiler room area. Provisions are also being made for a recreation room, locker room and an assembly room for approximately 75 persons.

The turbine room and service building additions have been designed architecturally to conform to the original design of the building, with stone belt courses, curved head windows and a very heavy cornice, along with all of the other details of 1917 to 1922 design.

As this is a semi-outdoor boiler installation, we are using a box corrugated aluminum siding with fiberglass insulation and a smooth aluminum sheet on the inside as enclosing walls for those areas where it is required. The same design of aluminum panel without insulation or inside sheet is being used for the coal handling structures. A new screen structure has been built across the intake bay in front of the large screen house which was built in 1928. The screens in this new structure are exposed to the weather and are serviced by a gantry crane.

From the point of view of the civil engineer the most interesting, difficult and hazardous part of the work has been the additions and alterations to the intake and discharge tunnels. We were faced with the problem of not only enclosing the water intake channel between the 1928 screen house and the open end of the intake tunnel, the removal of a 48-inch discharge line used for ice melting and its replacement with an 84-inch pipe, but also with the problem of getting the cooling water at the rate of 240 cubic feet per second into the intake tunnel so that the station could be kept operating.

How It Was

The arrangement of the water intake prior to the present construction consisted of an excavated bay with a bottom which was about four feet below the bed of the river. This bay was crossed by a bridge carrying the principal road leading to the station and a screen house containing a single row of five traveling screens. At the rear of the screen house was the semicircular end of the bay where the water changed direction from south to west and passed through a smaller screen house on the west bank which contained two screens in a single row. This was the original screen house and was built at the entrance to the intake tunnel. Immediately in front of this small screen house was a submerged concrete basin about 20 feet square which originally provided some protection against erosion at this point.

Discharge Tunnel

The discharge tunnel runs parallel to the intake tunnel and starts at a point 32 feet west of the east end of the turbine room under the base slab, and runs west or down stream discharging into the Miami River at a dam which is arranged to provide recirculation during low flow in the river. The original installation also included a 48-inch cast iron pipe encased in concrete running east from the end of the discharge tunnel and paralleling the intake tunnel out to the screen house, to provide ice melting water when the river contains needle ice.

Due to the length of the turbines

it was necessary to place them in line east and west in the turbine room so that the turbine room extension and the service building came out over the intake bay in the rear of the screen house and required the complete enclosure of the water circulating system in the rear of the large screen house. It was necessary to remove the 48-inch, cast-iron line and extend the discharge tunnel as an 84-inch, reinforced concrete pipe out from under the original building to pick up the discharge from the #5 turbine condensers and then extend the discharge as a 60-inch pipe to provide ice melting in front of the new screens.

In order to keep the ground water out of the construction area for the intake tunnel and to avoid the use of tunnel liners and a considerable amount of cribbing and shoring under the existing building, we employed the Intrusion Prepak Corp. to pump cement grout into the gravel under the end of the intake tunnel, the area to be occupied by the new tunnel and under the large screen house, so as to provide a tight seal.

We also pumped grout under the station base slab in order to stabilize the soil so that we could remove the 48-inch pipe and install the 84-inch discharge line without interference and assure ourselves of adequate support for the old turbine room slab.

The removal of the 48-inch cast-iron pipe presented a serious problem due to the fact that it had been incased in concrete which made it very difficult to burn or break out. We found that by removing a four-to-six-inch-wide segment in the top of the pipe by burning with electric arc that we could then break out the remainder of the pipe with wedges, crow bars and jack hammers.

In the construction of the intake tunnels, it was necessary to build a coffer-dam along the center line of the existing tunnel as extended out to the wall of the center screen well so as to divide the channel and permit the circulating water to pass through two screens and half of the intake tunnel into the building.

A bulkhead was placed across half of the intake tunnel to keep the water from flowing back into the dry side of our coffer-dam. Three of the screens were removed from the screen house and due to the fact that the screen chambers were not designed to be dewatered, it was necessary to build bulkheads and fill these chambers with sand in order to compensate for the water pressure and at the same time close them to prevent water flowing through these chambers.

Upon the completion of the floor and walls for the first half of the tunnel, the coffer-dam was reversed and the second section was constructed. At the same time we were installing the 84-inch and 60-inch pipe connections to the discharge tunnel and for the ice melting. Fortunately, during the construction we were not involved in any excessive high water.

The roof of the intake tunnel was a very interesting problem. Due to the flow of water through the tunnel, it was impossible to install the normal form work and shores which would have been used had this work been done in the dry. A rather novel system of precast concrete beams each with a general cross section of a railroad rail were used as the bottom form for the six-foot concrete mat to the basement floor. These beams had a base 36 inches wide by 6 inches thick, a 5-inch stem and a 6 by 12-inch head. The beams were 25 feet long. These beams were placed across the tunnel with the base flanges as tight together as possible and the base slab poured into the area so that the beams and the base slab became a monolithic unit.

We used the same grouting method as under the tunnel, to support the floor of the #8 boiler room while we constructed a wall eight feet high between the new boiler area and the floor of the old boiler room.

The remainder of the problems from a structural point of view were the normal situations which usually arise in making an addition to any building.

The turbine foundations have been cast as a continuous pour from the top of the basement slab up to the top of the foundation. The heaviest single piece of structural steel is a 52-ton girder 60 feet long, over the boiler.

We have used inverted 18-gage galvanized roof deck welded to the structural steel as a bottom form for the interior floor slabs. We have found that it is much faster and more economical than the conventional wood forms. It also removed the fire hazard while the forms are in place and the great amount of debris which is usually present when floor forms are removed.

BLBS Distributed 40 Per Cent More Literature in 1957

DISTRIBUTION by electric utility companies of educational literature published by Better Light Better Sight Bureau in 1957 was up 40 per cent over the previous year, it was revealed in a report on the Bureau's activities released by Walter G. McKie, general sales manager, Rochester Gas and Electric Corp., and Chairman of the Bureau.

Records of the dollar revenue to the Bureau from the distribution of literature about light and sight show that last year, 18 per cent of this revenue came from the distribution of consumer folders and booklets on home lighting; 28 per cent came from the distribution of the bi-monthly periodical *Better Light Better Sight News* and 54 per cent from the distribution of teaching aids about light and sight, for use in school classrooms.

Nearly 1,000,000 pieces of school material were distributed by utilities. Distribution of these teaching aids represented a 70 per cent increase over the previous year. Revenue from *Better Light Better Sight News* was up 26 per cent over 1956, while circulation increased from 13,338 to 16,060.

The tremendous increase during 1957 in the distribution of school materials indicates an increasing awareness of the value of long-term education on the principles of light and sight, Mr. McKie reported.

In recognition of this trend, he added, the Bureau inaugurated its "Cooperative Teaching Aid Plan" in January, 1958, whereby the Bureau will provide direct distribution to teachers for utilities who sponsor the plan. Seventy-six electric companies already have enrolled as sponsors.

A number of new publications are being added to the Bureau catalog, according to the report.

Street Lighting Film

THE Pacific Coast Electrical Association Technical Subcommittee on Highway Lighting has produced a motion picture on street lighting. The film is a 16-mm optical sound picture, 18 minutes in length and in black and white. No special lighting was used to film good and bad street lighting.

This excellent sales tool is noncommercial and nontechnical, bringing the actual lighting conditions in the field to an assembled audience. It is suitable for any group of citizens or city officials who are interested in better lights for streets and roadways.

A preview of the film may be arranged by request directed to the Pacific Coast Electrical Association, 530 W. 6th St., Los Angeles 14, Calif., or 681 Market St., San Francisco 5, Calif.

Metal Sheath Electric Heating Course

(*Continued from page* 48)

weeks. As a suggestion, we would ask the committee to consider with the manufacturers the possibility of substituting for this heavy equipment colored cutaway projector slides which could be made to show the equipment with relation to the application which it serves.

We also suggest that the viewgraph films be blown up in order to give greater visibility to large classes. Typewritten words are not readable at 30 to 40 feet.

We also suggest that the course be expanded to seven sessions and the manuals rearranged accordingly.

We would like to see included in the course a number of test papers to distribute to the students for homework.

As a suggestion only, we recommend the use of the Wiegand film near the end of the course instead of the beginning. We are doing this after receiving complaints that we started our sales angle too soon.

Just in case all of these suggestions lead you to believe that we are dissatisfied with the course as it exists, please let me say again that we like it, we are using it, and we believe we are securing very worthwhile results. If your company is not using it at the present time, let me recommend most heartily that you do so.

Farm Better . . . Electrically

Promotional Materials

'A Program of Progress for the Farmers of America'

12-page, 2-color, illustrated Industry Booklet describing how the Farm Better Electrically program may be organized and promoted by electric power suppliers, manufacturers, dealers, etc. FBE-5704.

Prices: Single copy $1.25
2-5 copies ..... 1.00 each
over 5 copies ..... .75 each

'How You, Too, Can Farm Better Electrically'

32-page, 2-color, illustrated Consumer Booklet designed to stimulate interest in greater use of electric farm productive equipment. FBE-5705. Minimum order, 100 copies.

Prices: 100-499 copies ..... $12 per C
500-999 copies ..... 10 per C
1,000 copies and over ..... 9 per C

Decals and Stickers

FBE-3—Decals, 10″ diameter, red on gold. For dealer windows, car and truck bodies. Package of 50, $10 per package.

FBE-C-(1)—Package consisting of 100 3-inch and 50 10-inch decals. Package, $12.

FBE-C-(2)—Package consisting of 100 3-inch and 50 10-inch decals, plus 1,000 1⅜″ stickers. Package, $14.50.

FBE-1—Stickers, 1⅜ inch diameter. For letterheads, envelopes. Package of 1,000, $2.75.

FBE-2—Decals, 3″ diameter. For dealer windows, car and truck bodies, etc. Package of 100, $4.

'Planned Farm Ventilation'

16-page booklet containing suggestions for planning, organizing and conducting a Farm Ventilation Sales and Educational Activity. Includes outline for Sales Training Meeting, direct mail messages, radio spot announcements, etc. 35 cents per copy. FBE-V-5700.

Farm Ventilation Display Kit

Window banner, counter card and five pennants for display in dealers' stores and power suppliers' showroom windows. Minimum order, 10 kits, 90 cents per kit.

Chromespun Banner

10′ x 4′. Slogan and seal in white on red background. Gold fringe, $10 each. (These banners must be ordered directly from supplier—Hollywood Advertising Co., 114 East 32nd St., New York 16, N. Y.)

Key-Shaped Stickers—for car bumpers, etc.

Prices: 200-499 ..... 12½ cents each
500-999 ..... 12 cents each
1,000-2,999 ..... 11½ cents each
3,000 or more ..... 11 cents each

(Orders for these key-shaped stickers must be placed directly with the supplier—Bishop Publishing Co., 168 N. Clinton St., Chicago 6, Ill.)

Address orders for all other materials to:

Farm Better Electrically Program
Room 2626, 420 Lexington Ave.
New York 17, N. Y.

The picnic proposed by Benjamin Franklin for the spring of 1749 is depicted in this diorama made of beeswax figures by Joseph Hopkins for the Franklin Room of the Atwater Kent Museum in Philadelphia.

Use of Electricity in Cooking Envisioned by Benjamin Franklin in 1749

LONG before the era of electricity with its electric ranges, broilers and complete electric kitchens, Benjamin Franklin envisioned the first steps toward cooking electrically.

In 1749 Franklin wrote to Peter Collinson, a fellow scientist in London, commenting on experiments with electricity.

"Chagrined a little that we have been hitherto able to produce nothing in this way of use to mankind, and the hot weather coming on when electrical experiments are not so agreeable, it is proposed to put an end to them for this season, somewhat humorously, in a party of pleasure on the banks of the Schuylkill," Franklin wrote.

What he had in mind was to hold a picnic and use electricity in helping to prepare the meal.

"A turkey is to be killed for our dinner by electrical shock," Franklin wrote, "and roasted by the electrical jack, before a fire kindled by the electrified bottle."

The electrical jack was not a true motor, but a device which could be made to rotate by using static electricity to attract or repel its elements.

The "electrified bottle" is a reference to an improvement Franklin had made to the Leyden jar, an early method of storing static electricity. While the heating element was not electrical, at least Franklin anticipated today's popularity of the rotisserie.

Details of Benjamin Franklin's electrical experiments appear in a pamphlet printed and sold by Edward Cave, At St. John's Gate, London, 1751, titled "Experiments and Observations on Electricity, Made at Philadelphia in America by Mr. Benjamin Franklin and Communicated to Mr. P. Collinson of London (FRS)."

A copy of this pamphlet is found in the library of the American Philosophical Society in Philadelphia, Pa.

Mr. Franklin's experiments led to important contributions to the science of electricity. One of these was his conception of electricity as a fluid and the substitution of the terms "positive" and "negative" or "plus" and "minus" for the two "types" of electricity which thus far had been established.

Benjamin Franklin, born in Boston on Jan. 6, 1706, moved to Philadelphia as a 17-year-old in 1923 and enjoyed a career difficult to parallel in American history.

Printer, publisher, organizer of civic enterprises, statesman and diplomat, he typified through his scientific work what today would be a brilliant research engineer, who received many honors in America and in Europe for his work in electricity.—*Reprinted from Philadelphia Electric Co.'s Current News, January-February, 1958.*

National Electrical Week Participation Increases

PARTICIPATION in the National Electrical Week celebration Feb. 9-15 was 50 per cent over that of the previous year.

More than 10,000 EEI National Electrical Week kits were distributed, primarily by utilities. Orders for NEW speech and copy material were received from 406 companies throughout the country, including most EEI members. One hundred and nine Edison lamps were purchased and 424,000 of the LBE idea books were ordered.

More LBE Kits Sold

Nearly 24 per cent more EEI National Electrical Week kits were sold this year than in 1957. The International Edison Birthday Committee reported twice as much Science Youth Day activities as last year, partly due to new support. About 700,000 home electrical inspection reports were distributed in high schools.

Merrill E. Skinner, National NEW Committee chairman and vice president and director of sales, Union Electric Co., St. Louis, said, "We are gratified to report that National Electrical Week activities reached new and higher levels of activities in 1958 throughout the country.

"More companies in our industries are capitalizing on the nationwide atmosphere of observance to further their basic educational and sales programs and to stimulate an early annual start for these programs. We believe the cumulative impact of a total industries' effort each year is of tremendous value to our overall public relations effort."

More than 50 national advertisers supported the observance.

'TV from the Atom'

As a highlight of Westinghouse Electric Corp.'s efforts, the first network television presentation ever done with the aid of electricity from the atom was broadcast out of Pittsburgh on Feb. 10. As part of the company's "Studio One" program, Mark Cresap, new president of Westinghouse, appeared personally to tell about the millions of dollars electric companies are pouring into new facilities to keep down the cost of this power. The estimated audience was 22,000,000 who heard the NEW story on television.

Time magazine in its Feb. 10 issue carried a four-page Westinghouse color ad about NEW and atomic power. A "fold-out" ad, it was the first of its kind ever accepted by *Time*. All 11 of the Westinghouse television and radio stations carried NEW features during the week. Ads were used in other magazines.

General Electric Co., a major participant, observed the week with many activities. The commercial time for "General Electric Theatre" was given over to National Electrical Week for the first coast-to-coast showing of the newest concept in electrical living—the Medallion home. The "Arthur Godfrey Time" commercial on network radio was also given over to a special NEW message.

Nearly 3000 high school students toured the GE Lighting Institute in Cleveland and saw a "Magic Light" stage show. A special NEW editorial and cartoon were syndicated to more than 80 editors of plant newspapers at GE locations, covering 250,000 company employees. A special "give an electrical valentine" promotion by the Air Conditioning division was timed to coincide with National Electrical Week. The current issue of the Housewares & Radio Receiver division distributor-dealer magazine, *Traffic Builder*, was based on the NEW theme.

The St. Louis Board of Trade on Edison's birthday, Feb. 11, lighted two giant searchlights on the downtown Mississippi River levee to remind residents of Edison's achievements. The lights, placed 630 feet apart and beamed to cross 575 feet in the air, duplicated the dimensions of a stainless steel arch proposed for the site. Designed by architect Eero Saarinen, the arch is to depict the "Gateway to the West."

The project, proposed by Union Electric Co., was executed for the trade organization by Union Electric. The arch will commemorate the historic role of St. Louis in development of the Louisiana Purchase area.

Some of the other companies and organizations who have reported NEW activities are: Allis-Chalmers Manufacturing Co., Hotpoint, Live Better Electrically, Electric Companies Advertising Program, Reddy Kilowatt, Waring Products, Frigidaire, Whirlpool, Reynolds Metals Co., McGraw Edison, and numerous electric utility companies.

18th Young Men's Utility Conference of Indiana to Be Held April 8-9

THE 18th Annual Young Men's Utility Conference will be held April 8-9, at the Hotel McCurdy in Evansville, Ind., Edmond W. Hebel, vice president of the Indiana Electric Association, which sponsors the conference, has announced.

Indiana's five major stockholder-owned electric utility companies will send a total of more than 200 delegates to this year's conference.

The general arrangements committee is headed by James R. Price of the Southern Indiana Gas and Electric Co. Mr. Price, 29, has been associated with the electric utility industry for more than 10 years, all with SIG&E. He is the chairman of the SIG&E Young Men's Forum, an organization for management personnel under 35 years of age.

Other members of the general arrangement committee are: John W. Stefoff, Indiana and Michigan Electric Co., vice chairman; John E. Nickoloff, Northern Indiana Public Service Co., secretary; Robert E. Cronin, Indianapolis Power and Light Co., and Edward L. Shute, Public Service Co. of Indiana, Inc. Mr. Hebel has designated C. W. Boringer, personnel director at PSCI, to represent him at the arrangements meetings preparatory to the conference. IEA Secretary A. C. Crandall will advise the general arrangements committee.

The two-day conference will feature a tour of Whirlpool Corp's Evansville division refrigeration assembly plant and speakers from various fields associated with the electric industry. Local arrangements will be carried out by representatives of the SIG&E Young Men's Forum.

New Definitions Reflect Changing Technology

By Chester L. Dawes

Professor, School of Engineering, Harvard University

Condensed from The Magazine of Standards, January, 1958

THE complete new edition of *Standard Definitions of Electrical Terms*—the first revision since 1941—will be available soon with each Group of Terms listed in individual pamphlets. Already several of these Groups of Terms are available.

The American Standards Association approved the initiation of a project in 1928 to prepare definitions of electrical terms on the recommendations of the American Institute of Electrical Engineers. Under this authorization, Sectional Committee C42 was organized under the sponsorship of AIEE.

In 1941 the first edition of the *American Standard Definitions of Electrical Terms* was approved by the ASA. But almost as soon as the 1941 edition had been published, it became apparent that work on a new edition would be necessary as new terms already were rapidly accumulating.

It was necessary to defer this work until after World War II, during which so many new developments in electrical engineering occurred that revision became almost mandatory.

The sectional committee was reorganized in 1946 with the scope of its work to cover the definitions of technical terms used in electrical engineering, including correlation of definitions and terms in existing standards, the same scope as the initial project in 1928.

Briefly, the chief purpose of ASA is to provide systematic means by which organizations concerned with a standard may cooperate "to the end that duplication of work and the promulgation of conflicting standards may be avoided."

Hence, in organizing a sectional committee all the "organizations concerned" should have representation. Since electrical applications and methods enter nearly every field of engineering and science, the C42 Sectional Committee must necessarily have a wide representation.

This includes not only professional, engineering, and scientific organizations but also such organizations as the Mathematical Society of America, the American Society for Engineering Education, the National Bureau of Standards, the Association of American Railroads, National Fire Protection Association, the armed forces, including the Army, Navy, and Air Force, and manufacturers' organizations. The Canadian Standards Association is also represented.

In the committee preparing the present edition, there are 33 such organizations, as compared with 31 in the committee that developed the 1941 edition. The sectional committee, which includes the representatives of these organizations, now numbers 72 members, as compared with 45 in the 1941 edition.

Each chairman appoints the members of his own subcommittee, with the objective of securing as wide representation in the field as is possible. The present subcommittee personnel is 179, as compared with 120 in the 1941 edition.

As in the 1941 edition, the field of electrical engineering is divided into major Groups and subsidiary sections, which are denoted respectively by the first two parts of the three-part number. For example, the definition for the term "rotor" is numbered 10.11.435. This shows that the definition is in American Standard C42.10-1957, covering Group 10, Rotating Machinery; that it is in Section 11, Machine Parts (other than Windings) in Group 10; and that 435 is the specific number of the term. The alphabetical index refers to the term by number and also by page.

It was the original intention to issue this second edition as a single volume, as with the 1941 edition, but the rapid changes and the highly accelerated development of new terms required greater flexibility, so that this edition is issued with each Group as an individual pamphlet with its own index. When all the Groups are issued there will be a general index, and a suitable binder will be made available to contain the individual pamphlets.

The definitions of each Group originate in the subcommittee whose membership represents widely differing interests in the field. These subcommittee members not only study the former C42 definitions, but also consider the definitions appearing in related standards of the American Institute of Electrical Engineers and in American Standards.

After the sectional committee has

These American Standard Definitions of Electrical Terms are already available:

Rotating Machinery, C42.10-1957	$1.20
Switchgear, C42.20-1956	$1.20
Industrial Control Equipment, C42.25-1956	$0.80
Instruments, Meters and Meter Testing, C42.30-1957	$1.20
Generation, Transmission and Distribution, C42.35-1957	$1.20
Electrochemistry and Electrometallurgy, C42.60-1956	$0.60
Electron Devices, C42.70-1957	$1.00
Electrobiology, including Electrotherapeutics, C42.80-1957	$0.60
Mining, C42.85-1956	$0.60

Publication of a number of additional standards is expected early in 1958:

Transportation, C42.40-1956
Transportation—Air, C42.41-1956
Transportation—Land, C42.42-1956
Transportation—Marine, C42.43-1956
Illuminating Engineering, C42.55-1956
Communications, C42.65-1957
Miscellaneous, C42.95-1957

voted final approval of a Group, it so reports to the Standards Committee of the sponsor, the American Institute of Electrical Engineers. The Standards Committee and the sponsor in turn recommend the approval of the Group as an American Standard to the Electrical Standards Board of ASA, submitting the record of the voting in the sectional committee. When the Electrical Standards Board and the Board of Review of ASA have voted their approval, the Group then becomes an American Standard.

After over 10 years of preparation, several of the Groups, through the foregoing procedure, have already become American Standards and have been issued in pamphlet form. The remaining Groups are rapidly passing through the editing and printing processes and will soon be available.

Because of the many new developments since the 1941 edition, many changes must necessarily have occurred in the different Groups of this edition. Briefly, the more important ones are as follows:

Group 05 — General (Fundamental and Derived) Terms: These terms are basic to those terms defined in the subsequent Groups or sections. In Group 05, the definitions begin with the general mathematical and physical terms—these being the scientific terms upon which engineering as applied science is based—followed by the more specific fundamental terms applicable to the many branches of electrical engineering.

Attempts have been made to attain simplicity in the definitions by defining the terms in "word pictures" wherever possible, even in defining a mathematical term, supplementing the worded definition with a mathematical formula where this applies. It is hoped that the combination will satisfy both the theoretical and the more practical-minded engineer.

Many electrical engineering devices, such as transformers, find applications to power transmission, communications, control equipment, and many other specific uses. In Group 05, the fundamental definition is given; the particular *kind* of transformer is then defined in the pertinent Group under consideration. Where a term is applicable to several fields, therefore, it has been thought most expedient to include it in the General 05 section.

Because of the recent widespread interest in the data processing and computing devices field, a new section of Group 05 terms—05.56 Computers—has been introduced. These terms include both fundamental definitions and applied definitions in this particular field of engineering. Because of their specific field of interest, it is believed more appropriate to locate these definitions in one place than attempt to divide the terms into the many branches as represented by the several Groups of the standard.

The magnitude of the work in revising the Group 05 glossary is represented by the increase in number of sections of the 05 terms—14 as compared to 11 in the 1941 edition —comprising over 900 terms in the new group, and less than 500 in the old. Even this increase should not be considered final, as new terms will continue to be introduced as expanding technical knowledge will demand. This revision therefore cannot be considered final but must be a continuing program.

Group 10—Rotating Machinery: The revised definitions for this Group include 323 terms as compared with 184 in the 1941 edition. The number of terms would be greater had it been considered advisable to include every possible term. Obviously, some of the other and newer branches of the electrical art have been developing faster, necessitiating a greater increase in the number of terms for them than for rotating machines.

Nevertheless, it is found that 25 new terms for types of machines and eight qualifying terms on excitation and types of windings have been added, indicative of growth even in this old, established field.

A new section on "Position Transmission Systems and Machines," comprising eight terms for synchro systems, transmitters, and receivers, has been added.

The section on machine parts has been augmented three-fold. These definitions serve a useful purpose in that they help users and manufacturers to avoid misunderstanding in ordering and furnishing replacement parts.

A separate section devoted to windings has been provided and 10 new terms added.

Terms pertaining to enclosure, protection, and ventilation have not increased greatly in number but the names used and the definitions have been changed materially in keeping with changing industry usage.

The terms for Synchronous Machine Quantities received thoroughgoing consideration by a working Group formed for this purpose. This resulted in a few fundamental changes, refinements in existing terms, and the addition of nine new terms.

A section is now devoted exclusively to excitation terms and seven terms have been added.

Minor changes in torque terms have been made, and there are 14 new definitions in the "Not Otherwise Classified Section."

Group 15—Transformers, Regulators, Reactors, and Rectifiers: The total number of terms is 175 as compared with 77 in the 1941 edition. The increase in number by sections is as follows: 20-Transformers, from 54 to 63; 30-Regulators, from 2 to 5; 40-Reactors, from 7 to 13; 50-Rectifiers, from 15 to 94. (The single "General" term, Section 10, in the 1941 edition is omitted.) Many of the new definitions in Section 20 relate to the different types of rating, which were not given in the 1941 edition.

Group 20—Switchgear: The total number of terms is 473 as compared with 345 in the 1941 edition. The greatest increase occurs in the General terms, in which there were only nine terms (excluding cross-reference terms) in the 1941 edition as compared with 72 in this edition. The section on Interrupting Devices in the 1941 edition has been changed to Circuit Breakers in this edition, and the number of terms increased from 69 to 92. The number of Relay terms has increased from 82 to 95; Lightning Arrester terms from 5 to 26; Regulator terms from 6 to 12; Network Protector terms from 1 to 7; Switchgear Assemblies terms from 65 to 84.

Group 25—Industrial Control Equipment: The title of Group 25 has been changed from "Control Equipment" to "Industrial Control Equipment" in order to state more clearly the area to be covered. The word "Control" is now used very often in connection with power systems, military equipment, communication systems, do-

mestic appliances, business management, etc. Hence, it was thought advisable to use the term "industrial control" which is well understood as covering essentially control of power utilization equipment as used in industry.

The 1941 edition of C42 contained 54 definitions in Group 25. During the past decade, the industrial control industry has experienced a very healthy growth and magnetic and electronic controls have been introduced to many new applications. Thus, many more terms have found widespread use and the new edition contains 215 definitions of terms.

It was found desirable to rearrange the headings under which the terms are listed, and they are now grouped as follows: General; Parts and Enclosures; Switches, Relays, Contactors; Controllers and Starters; Electric Drives; Servomechanisms and Regulators; Electronic Control; Qualifying Terms; Duty, Service, and Rating; Protection.

Group 30—Instruments, Meters, and Meter Testing: In 1941 Group 30 contained 152 definitions; in the 1957 edition this has been more than doubled and counts up to 312. The increase has come partly from the inclusion of new sections, one on terms used in analyses of measurement and the other on terms used in telemetering. The terms have been rearranged to some extent so that now terms referring to each of the categories "Instrument" and "Meter" have sections dealing with "Characteristics," "Basic Types," and "Parts." Also, the old list of specific instruments has been split up by listing them in separate sections which contain, respectively, definitions of instruments used in communications, in magnetic measurements, in bridge circuit nomenclature, and in temperature measurements.

Group 35 — Generation, Transmission, and Distribution: The total number of terms is 431 as compared with 356 in the 1941 edition. The greatest increase occurred in the sections on Generation, in which the increase is from 41 to 58; on Details of Construction (Overhead) in which the increase is from 46 to 64; on Wires and Cables, in which the increase is from 47 to 72; and on Low Frequency and Surge Testing, in which the increase is from 24 to 37. A new Section 17, Grounding Devices, containing 16 new terms, has been added.

Group 40 — Transportation (General): The total number of terms is four, compared to 28 in the 1941 edition. However, most of the General Terms in the 1941 edition have been transferred to Group 42, particularly to Sections 01 and 37, General and Vehicle Control Equipment, respectively.

Group 41 — Transportation — Air: This group has been greatly expanded, there now being 57 terms as compared with nine in the 1941 edition. There are now four sections: 01, Electrical Equipment; 16, Wiring and Associated Equipment; 26, Electronic Equipment; 36, Instruments. The new terms reflect many of the later developments in aeronautics, there being definitions, for example, of military applications and electronic-approach landings.

Group 42 — Transportation — Land: The total number of terms is 384 as compared with 286 in the 1941 edition. The largest increases occur in Sections 16, Vehicles; 46, Railway Signals and Interlocking; 56, Car Retarders. In Section 16, definitions of many diverse types of electric locomotives, cars, trains, and buses have been added. Similarly, in Sections 46 and 56 many new terms relating to the latest developments in railway signals and in car retarding practice have been added. There are two new sections: 36, Vehicle Rotating Equipment; and 37, Vehicle Control Equipment. The former Section 22, Mine Vehicles, is omitted in this Group and the terms transferred to the new Group 85, Mining.

Group 43—Transportation—Marine: This is an entirely new Group containing 73 new definitions. There are seven sections which are as follows: 01, General; 06, Ship's Service System; 11, Emergency System; 16, Interior Communication; 21, Aids to Navigation; 26, Electric Propulsion; 31, Associated Marine Terms.

Group 45—Electromechanical Applications: In the 1941 edition Group 45 had two sections, 10—Elevators; and 11—Cranes, Derricks and Hoists. The section on elevators was taken word for word from the 1937 American Standard Safety Code for Elevators, Dumbwaiters and Escalators.

The revised Group 45 definitions followed the same procedure, since a new elevator code was currently being prepared by a Group more closely associated with elevators, and it did not seem desirable to have any discrepancies between American Standards.

In view of the above background, and in view of the fact that all the comments received involved details of definitions taken from the elevator code, it has not seemed possible to take any further action.

Group 50—Electric Welding and Cutting: The total number of terms is now 100 as compared with 77 in the 1941 edition. Two new sections have been added—Brazing, and Arc and Oxygen Cutting.

Group 55—Illuminating Engineering: The total number of terms is 151 as compared with 179 in the 1941 edition. A section on Color has been added, whereas the section on Aeronautic Lighting is omitted.

The material on illuminating engineering in the 1941 edition was identical with American Standard Z7.1-1942, which had been prepared by the Committee on Nomenclature and Photometric Standards of the Illuminating Engineering Society.

This IES Committee has been working on a revision of American Standard Z7, but the entire revision has not yet been completed. The material being published as Group 55 of C42 at this time incorporates all of the revisions that have been completed and approved to date. The remaining material for which the revisions have not yet been completed or approved has been worked out by the C42 subcommittee to represent the present status of terminology in this field as accurately as is practicable.

Group 60—Electrochemistry and Electrometallurgy: The total number of terms is 381 as compared with 398 in the 1941 edition. However, in the 1941 edition there was a section on Rectifiers. The rectifier definitions have been transferred to Group 15.

Group 65—Communication: This is a revision and enlargement of the definitions of communication terms which appeared in Group 65 of the

1941 edition. This new glossary includes a total of 1780 communication definitions as compared with 528 in the 1941 edition. In the 1941 edition, Wire Communication and Radio Communication were prepared by two subcommittees. In this edition both categories were prepared by a single subcommittee.

Group 70—Electron Devices: The total number of terms is 344 as compared with 95 in the 1941 edition. The title of the Group has been changed from "Electronics" to "Electron Devices." The term "electronics," in accordance with modern usage has been defined to include not only electron devices but also their utilization. To avoid conflict with other Groups which cover fields of application in which electron devices are utilized and which, therefore, form part of the broad field of electronics, the scope of Group 70 has been limited to the electron devices themselves. The term "electron device" has been defined also, in accordance with present-day usage, broadly enough to cover both electron tubes and semiconductor devices. Because the field is new, and there is not as yet sufficient agreement among committees of AIEE and IRE, few semiconductor devices are defined in this edition.

Group 75 — Radiology: Physically, the new Group is changed in that it is divided into several principal sections: 01, General; 06, Instrumentation; 11, Units and Measurements; 16, Applications; 21, Protection; and 26, Radioactivity.

A considerable number of obsolete terms and units are retained or have been added to Sections 01 and 11. This is done because of the fact that these terms do appear in the literature and there is no other convenient repository for such historical information. So, while they may seem redundant, they were added to satisfy this need.

The sections on Dosimetry, Radioactivity, and Protection are perhaps already obsolete or at least incomplete. This field is growing rapidly, information and vocabulary of one year often changing and becoming pretty much obsolete and inadequate the year following. For the most current information pertinent to the matter of radiation dosimetry and protection the current revised figures of National Bureau of Standards Handbooks 59, 60, and 62 should be consulted—whatever figures are given in the text probably being no longer valid.

The most important single occurrence since the last edition has been the acceptance of a new unit of radiation measurement. For the first time we now have a unit of dosimetry which truly represents energy absorbed—the "rad," which was accepted at the International Congress of Radiology in Copenhagen in 1953, and is applicable to all types of ionizing radiation, is now the only accepted unit of dose. The roentgen remains as a unit of exposure with the "rem" and the "rep" retaining their usefulness in the field of radiation protection and health physics. NBS Handbook 62 should be consulted in reference to current terminology in dosimetry and measurement.

Group 80—Electrobiology, including Electrotherapeutics: The total number of terms is 100 as compared with 47 in the 1941 edition. In keeping with the many late developments in electrobiology, Section 06, Biology, has been greatly expanded, there now being 56 terms as compared with seven in the 1941 edition. Many obsolete terms are retained, but deprecated, since they still appear in the literature and their definitions should be available for reference. The definitions of the Group owe much of their value to the fact that so many members of the subcommittee are members of the medical profession.

Group 85—Mining: The first edition of American Standard Definitions of Electrical Terms approved in 1941 contained a group of only seven terms used specifically by the mining industry. Moreover, this Group (Group 42, Section 22) was restricted to mine vehicles (locomotives). When the decision was made to revise this volume to include new terms, it was recognized that rapid mechanization of coal mines had brought about the development of so many new types of machines and equipment as to justify setting up a new Group that would cover mining activities in addition to transportation.

It is recognized that the draft contains imperfections and does not include some terms that have come into being as methods and machinery progressed. In view of the rapid advances being made in both of these, any attempt to keep the definitions in step with them appeared to be virtually impracticable.

Group 95—Miscellaneous: The total number of terms is 155 as compared with 173 in the 1941 edition. Two sections of the 1941 edition, Thermoelectricity, and Signaling Equipment, are omitted in this edition and the definitions of the different classes of insulation have also been omitted since they were considered as terms more appropriate to a current standard than as more or less permanent definitions.

The chairmen of two subcommittees, Dr. M. D. Shulz of Radiology and Dr. F. T. Jung, Electrobiology, and many of the members of their subcommittees are not electrical engineers but rather doctors of medicine and members of the American Medical Association. The "wide representation" in the work on these definitions is illustrated in the fact that the committee has sought the assistance of the medical profession in proposing and defining terms "generally associated with electrical engineering in this country."

Although the sectional committee and its associated subcommittees were organized originally to compile the edition approved in 1941, and in a short time the present 1957-1958 revision will have been completed, the committee is a continuing one. It still exists for the purpose of considering and taking appropriate action on any new terms which may be submitted to it. Already definitions for proposed American Standards have been submitted to it for approval. Were the sectional committee not active, a serious impasse would result.

These standard definitions would never have been possible were it not for the voluntary contribution of time and effort by the several subcommittee chairmen and members. Being experts in their several fields they must necessarily hold important positions of high responsibility. Yet they have devoted much of their valuable time, combined with considerable traveling, to make possible this important glossary.

Thirteen-year-old Randolph C. Ryder, Jr., shareowner in Pennsylvania Power & Light Co., turns a spadeful of dirt, formalizing start of construction of the utility's new Brunner Island plant. At right is Chas. E. Oakes, PP&L chairman of the board, and at left is W. S. Brokenshire, engineering vice president of the utility.

13-Year-Old Shareowner Breaks Ground for Pennsylvania P & L's New Plant

A 13-YEAR-OLD shareowner of Pennsylvania Power & Light Co., Randolph C. Ryder, Jr., Lancaster, Pa., turned the first spade of earth to mark the start of construction of the utility's new Brunner Island plant near York Haven, Pa., along the Susquehanna River.

The third large PP&L postwar steam electric station, the plant, scheduled for completion late in 1960, will have an initial expected capability of 330,000 kilowatts, or twice the capacity of the two units at the utility's Martins Creak plant and presently the largest in the company's system. It will be of the semi-outdoor type design.

Completion of this unit will give the company a total of more than 1.7 million kw of generating capability.

At the ceremony, Chas. E. Oakes, chairman of the PP&L board, pointed out the significance of the young shareowner taking part in the ground-breaking. "First," he said, "he represents our customers of tomorrow and from all indications, his formal act here today, as big as this Brunner Island plant will be, symbolizes only the beginning of a great new electrical age. For at this moment, we already look ahead to the need for power plant capacity that by 1970 will be double what we now have.

"Second of the reasons," Mr. Oakes stated, "is that he is one of the company's shareowners. As a shareowner, he represents that vitally important group of people who by putting their savings to work in our business, help provide the monies needed to improve and expand our facilities. It is the investments of our nearly 95,000 shareowners that help make today's fine electric service possible. Each time our customers snap an electric switch, they share in the benefits of these shareowners' investments.

"Third, he is a very special kind of shareowner. Being under 21 years of age, his ownership of our securities symbolizes the very progressive action taken by the legislature of the Commonwealth of Pennsylvania under which minors can now hold the securities of American business enterprise.

"Thus, by the time such young people of our state reach maturity they will have a real comprehension of what it takes to make a business tick and what it means to share in the fortunes of a business. Even now, too many adults lack that understanding. Actually, the opportunity of economic education of our children today will determine both the form and the substance of our economic system of tomorrow. The Pennsylvania legislature was among the leaders in this movement toward the broadening of the ownership of American business, being among the first 12 states to so act."

It is estimated that the company will spend more than $155 million in the next four years for new and improved facilities with the new Brunner Island plant representing the largest single item. This is an average of over $3.2 million dollars every month and will rise to more than $600 million, the total spent by the company since the end of WW II.

Stewart K. Brown

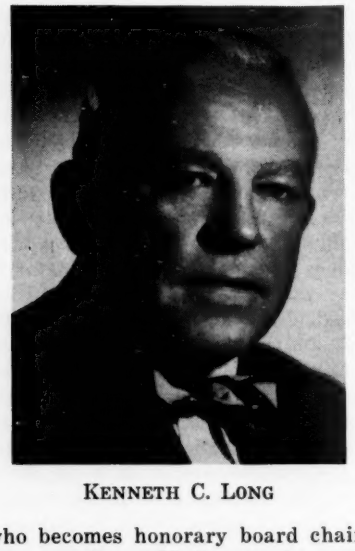
STEWART K. BROWN, superintendent of Potomac Electric Power Co.'s meter department, died Tuesday, Dec. 31, 1957, at Circle Terrace Hospital, Alexandria, Va. after a short illness.

Mr. Brown, who was 62, had been superintendent of the meter department since January, 1941. He had been with the company 42 years.

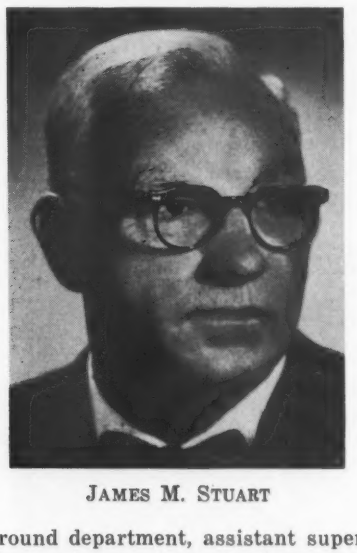
Mr. Brown was a member of the Meter and Service Committees of both the Association of Edison Illuminating Companies and the Edison Electric Institute, and was a life member of the American Institute of Electrical Engineers.

Personals

Kenneth C. Long, president of The Dayton Power and Light Co. since 1946, has been elected chairman of the board, succeeding **Frank M. Tait** who becomes honorary board chairman, and **James M. Stuart,** vice president and associate general manager, was named president and general manager of the electric company. Mr. Tait, associated with DP&L since 1904, continues as a member of the board, but will devote more time to the Frank M. Tait Foundation which was created by Mr. Tait more than two years ago.



KENNETH C. LONG



JAMES M. STUART

Mr. Long began his career with the utility in 1913 as an electrician's helper. His upward climb took him through a variety of positions. He became vice president and associate general manager in 1936 and in 1946, when Mr. Tait resigned as president to concentrate on the chairman's position, he became president. He left the Dayton utility in 1925 and for four years worked for other utilities until he returned to DP&L in 1929. He was elected vice president in 1934. Among the civic projects and organizations in which Mr. Long has participated are: Dayton District Development Committee; Ohio Safety Council; University of Dayton, and others. He is a member of the Steering Committee of the East Central Nuclear Group.

Mr. Stuart joined DP&L in 1923 as a co-op student from the University of Cincinnati. His career was marked by steady promotions. He has held the position of clerk in the line department, foreman in the underground department, assistant supervisor and supervisor of underground. In 1942 he was made manager of the Electric division. He was elected vice president in 1947 and associate general manager in 1948. He is a director of the Ohio Valley Electric Corp. and the Ohio Electric Utility Institute. He also holds several important civic posts.

Mr. Tait, who is sometimes referred to as "the dean of the electric industry," during his utility career has been responsible for the direction of utilities in seven states and also in Japan.

He came to Dayton in 1904 to survey the area for a utilities investment firm. The local company was purchased and Mr. Tait placed in charge. When Mr. Tait and his associates bought DP&L, it had 700 customers. Today it serves more than 1,000,000 people in a 6,000 square-mile area, with properties worth more than $250,000,000.

In addition to his electric utility company interest, Mr. Tait is a nationally known industrialist. He is chairman of the board of Tait Manufacturing Co. of Dayton and a director and member of the executive committee of the U. S. Pipe and Foundry Co. of Birmingham, Ala. At one time he was active in the management of 35 major corporations.

Perhaps the most important feature of Mr. Tait's active life was his early association with Thomas A. Edison. Following his graduation from high school in Catasauqua, Pa., he helped the great inventor on an ore processing experiment.

Mr. Tait served as president of the National Electric Light Association during the early part of the century and served on many NELA committees.

Lyle McDonald, chairman of the board of Public Service Electric and Gas Co., retired Feb. 1 after 42 years with the company. He continues as a director.

Donald C. Luce, PSE&G president, succeeds Mr. McDonald as chief executive officer of the company. **Francis A. Keane,** vice president and director of the utility, was elected vice president in charge of finance.

Mr. McDonald, who started with PSE&G in 1916 as an accountant, has been a director since 1944 and chairman since 1954. He has held various executive positions in the company, having become comptroller in 1937, vice president and comptroller seven years later and vice president in charge of finance in 1948, the post he held at the time of his election to chairman.

Long active in the affairs of Edison Electric Institute, he was a member of the EEI Advisory Committee from 1954 until his retirement. A graduate of New York University, he is a director of The Mutual Benefit Life Insurance Co. and The National State Bank of Newark.

Willis T. Johnson, vice president and executive engineer of California Electric Power Co., has been promoted to vice president and assistant general manager, to fill the vacancy created when **Fred Oldendorf** was named vice president and general manager six months ago.

Mr. Johnson, with the electric company 32 years, joined the company as a senior student. He was promoted successively to assistant local superintendent of a substation; local superintendent, general superintendent, district superintendent, district manager, assistant to the gen-

eral superintendent at company headquarters, assistant general superintendent, assistant executive engineer, executive engineer and vice president.

He holds a B.S. degree in electrical engineering from Colorado A&M and an M.S. in electrical engineering from Iowa State College. He is a member of the American Institute of Electrical Engineers and executive committeeman of that group's Los Angeles section.

Herbert P. Sedwick, president of Public Service Co. division of Commonwealth Edison Co., retired from active service Jan. 31, but continues to serve on Edison's board of directors.

Forty-four years ago when he joined the former Public Service Co. of Northern Illinois, the firm was providing about 60,000 customers with a combination of utility services. Today Public Service's exclusively electric service reaches more than 800,000 customers. He was first associated with Public Service Co. as an engineer in Evanston, Waukegan and Crystal Lake. He became general division manager in 1933, vice president in 1941 and executive vice president in 1951. In 1953 he was elected president of Public Service Co. of Northern Illinois and executive vice president of Commonwealth Edison. Since the merger, he has continued to head the PSC division of Commonwealth Edison and was executive vice president of the parent company from 1953 to 1955.

When Northern Illinois Gas Co. was organized in 1953 to take over the gas business of Public Service Co., Mr. Sedwick was named the first president of the company. He served in that capacity until 1954 and then was vice chairman and director until 1955. Mr. Sedwick is a member of the American Institute of Electrical Engineers, and a past president and honorary member of the Western Society of Engineers. He is a member of the board of trustees of the Illinois Institute of Technology and president of the John Crerar library.

The duties of Mr. Sedwick were taken over by **J. Harris Ward,** executive vice president of Commonwealth Edison.

Robert G. Olmsted, vice president in charge of finance and purchases, has assumed the new position of vice chairman of the board of the Long Island Lighting Co. In addition to his previous duties, he will direct over-all staff activities, planning and control. Mr. Olmsted started his career with the utility in 1933 in the accounting department and two years later became a financial analyst in an investment company. He rejoined Long Island Lighting and subsidiaries as treasurer in 1938. From 1942 to 1946 he was in the U. S. Air Force, rising to the rank of lieutenant colonel. Following his return in 1946, he became vice president in charge of finance, a director in 1951 and in 1954 purchasing was added to his duties.

Two new vice presidents, **Samuel J. Schiml,** controller, and **Edwin D. Smith,** manager of the public and industrial relations divisions, have been announced by The Dayton Power and Light Co. Both will continue their same duties. Mr. Schiml started with the company in 1927 as a clerk in the gas meter department. He was appointed supervisor of the general accounting department in 1948 and promoted to assistant controller in 1950. Mr. Smith joined DP&L as a district lighting representative in 1928. In 1934 he became assistant supervisor of the rural department and rose to supervisor in 1945.

R. E. Fife, financial vice president of Southern California Edison Co., has retired after more than 38 years' service with the company. He has been prominently identified with Edison's financial activities throughout virtually all of his company career and, as an Edison officer during the last 12 years, he has helped lead the company during its period of greatest growth. He joined Edison in June, 1919, as a bookkeeper in the accounting department. He was elected comptroller in 1945 and vice president in 1949. Mr. Fife was educated at Valparaiso University, La Salle Extension University and Alexander Hamilton Institute. He was born in St. David, Ariz. He was active in Edison Electric Institute, the Pacific Coast Electrical Association, the Los Angeles Chamber of Commerce and the Electric Club of Los Angeles.

Clarence H. Clark, superintendent of The Detroit Edison Co.'s Marysville power plant, and **Frank W. Shutko** of the Power Reactor Development Co. have been appointed operating chiefs of the Enrico Fermi Atomic Power Plant now under construction near Monroe, Mich. Mr. Clark will be superintendent of the steam turbine-generator station which will be owned by Detroit Edison and operated on steam produced by the adjoining reactor plant. Mr. Shutko will be superintendent of the reactor section of the new atomic plant.

The appointments were announced by Detroit Edison President **Walker L. Cisler** who also is president of PRDC, the non-profit corporation which will own and operate the nuclear reactor. Mr. Clark has nearly 30 years of power plant operation experience. He received a degree in mechanical engineering from the State University of Iowa and started with Detroit Edison in 1930 as a junior engineer. In preparation for his new assignment, he will receive operational training at one or both of two AEC reactors—the Sodium Reactor Experiment near Los Angeles and the Shippingport Reactor near Pittsburgh.

Mr. Shutko joined the Fermi project in 1956. He joined PRDC in 1957 and is now in training at the National Reactor Testing Station, assigned to the operating and engineering forces at the Materials Testing Reactor, Arco, Idaho. Mr. Shutko received a degree in electrical engineering from the University of West Virginia and a degree in mechanical engineering from the University of Michigan.

Eugene M. Simpson, assistant secretary and manager of insurance and pensions for The South Carolina Electric & Gas Co., was promoted to secretary and assistant treasurer of the company, succeeding **Lewellyn F. Pearce,** who resigned after more than 47 years with SCE&G.

Mr. Simpson joined the treasury department of the old Broad River

Power Co. in Columbia, S. C., in 1934. Prior to that time he had been associated with the Florida Public Service Co. at Orlando. He was named assistant secretary and assistant treasurer of the utility in 1946 and in 1953 received his former appointment.

Mr. Pearce in June, 1910, joined a predecessor company of SCE&G. The following year he was made secretary to the company's president. In 1937 the utility's corporate name was changed to The South Carolina Electric & Gas Co., and in 1938 Mr. Pearce was named secretary. During Mr. Pearce's association with the company, it has grown from a single city service organization to one that operates in 23 counties.

George E. Olmsted, assistant treasurer of Consumers Power Co., was elected secretary, succeeding **Lewis J. Hamilton,** retired. Mr. Olmsted was secretary-treasurer and director of Michigan Public Service Co. when Consumers purchased the assets of that company in 1950. He became assistant secretary of Consumers and later became an executive assistant. He was named assistant treasurer two months ago.

Two assistant comptrollers have been elected by New York State Electric & Gas Corp. **Charles W. Kelsey,** head of the general accounting department, will be responsible for the supervision of general accounting, and **Stuart A. Cole,** chief of the customer accounting department, will be responsible for the supervision of customer accounting.

Mr. Kelsey joined the company as a clerk in Ithaca in 1923 and became company-wide supervisor of construction accounting for the utility and several affiliated companies in 1929. He was made chief plant accountant in 1941 and was promoted to his most recent position in 1947. Mr. Kelsey is a past chairman of the EEI Plant Accounting and Property Records Committee.

Mr. Cole, a 1924 graduate of Syracuse University, joined the utility in 1926 as an accountant, and from 1927 to 1942 served as company office manager in several cities. He became head of the system methods department in 1942 and chief of the customer accounting department in 1956. He is a past coordinator of the EEI Customer Activities Group and past chairman of the EEI Customer Accounting Committee.

Appointment of **Wells P. Allen, Jr.,** power supply engineer, as chief power supply engineer for New York State Electric & Gas Corp., succeeding the late **Arthur R. Leinbach,** has been announced. Mr. Allen's headquarters will be in Binghamton, and he will be responsible for the dependable and economical production and transmission of electricity throughout the company's territory. He first joined the company in 1939 as an office boy and was transferred to the meter department in 1940. After the war he entered Rensselaer Polytechnic Institute in 1945 and was graduated in 1949 with a degree in electrical engineering. He rejoined NYSE&G in 1949.

Archie Kraakevik, purchasing agent for the Illinois Power Co. since 1946, was recently advanced to the newly created position of manager of services and supplies. He was succeeded by **John E. Simpson.**

In his new post, Mr. Kraakevik remains responsible for all company purchasing, and has these duties: awarding of construction contracts, managing the material stores departments and supervising the operation of four company-owned buildings. He is an engineering graduate of University of Illinois and joined the utility in 1926. Mr. Simpson has been assistant purchasing agent since 1947.

A. R. Harrington, assistant manager of the Nova Scotia Light and Power Co., has been appointed manager of the utility and its subsidiaries. He has been employed by NSL&P since 1936 and is a graduate of Nova Scotia Technical College.

Hollis Duncan, purchasing agent of Southwestern Electric Service Co., has been named to head the newly created system operating department. He will be responsible for the operation, maintenance, and construction of transmission and distribution lines, as well as for engineering and purchasing activities of the company. In other promotions, **George Burrill** was named system engineer and **Gayland Wilson** was promoted to manager at Grosbeck, Tex., to succeed **Roland Gardner** who has retired.

Miss Kate Allen Niblack, secretary and assistant treasurer of the Oklahoma Utilities Association, has retired after 37 years with the organization. She was succeeded by **Miss Thelma T. Jones** who has been with the association 21 years. She was assistant secretary for six years.

J. B. Austin, personnel manager of the Southwestern Public Service Co., has been appointed residential and commercial sales manager for the company. Mr. Austin, a graduate of the University of Texas, joined the company in 1942 as a meter tester in Plainview, Texas. He returned to Plainview in 1947 after military service and was named personnel and safety supervisor for the Plains division. In 1949 he transferred to Amarillo as safety supervisor for the entire system.

Mr. Austin was named system personnel manager in 1953.

Virgil K. Rowland of the Detroit office of The Detroit Edison Co. and Miss Julia Hopf of the company's New York Office were appointed assistant secretaries of the electric company. Mr. Rowland attended the University of Michigan and was a high school teacher before joining Detroit Edison 20 years ago. As a personnel assistant in the accounting office, he won the Alex Dow Award for outstanding service to his company. Miss Hopf, who joined the company in 1947, will continue to be assigned to the New York City office of the electric utility company.

George T. Lamason of the advertising and public information department, Kentucky Utilities Co., was elected chairman of Region III, Public Utilities Advertising Association, which includes the states of Kentucky, Ohio, West Virginia, and western Pennsylvania. He was elected at a recent PUAA regional meeting.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

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J. E. Corette, *Vice President* ..... The Montana Power Co., Butte, Mont.
Edwin Vennard, *Vice President and Managing Director* ..... 420 Lexington Ave., New York, N. Y.
H. S. Sutton, *Treasurer* ..... Consolidated Edison Co. of New York, Inc., New York, N. Y.
A. B. Morgan, *Secretary and Assistant Managing Director* ..... 420 Lexington Ave., New York, N. Y.

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A. M. Beebee ..... Rochester Gas and Electric Corp., Rochester, N. Y.
F. D. Campbell ..... Cambridge Electric Light Co., Cambridge, Mass.
C. B. Delafield ..... Consolidated Edison Co. of New York, Inc., New York, N. Y.
R. Roy Dunn ..... Potomac Electric Power Co., Washington, D. C.
R. H. Gerdes ..... Pacific Gas and Electric Co., San Francisco, Calif.
N. B. Gussett ..... Iowa Power and Light Co., Des Moines, Iowa
E. L. Lindseth ..... The Cleveland Electric Illuminating Co., Cleveland, Ohio
D. C. Luce ..... Public Service Electric and Gas Co., Newark, N. J.
M. S. Luthringer ..... Central Illinois Public Service Co., Springfield, Ill.
C. E. Oakes ..... Pennsylvania Power & Light Co., Allentown, Pa.
H. T. Pritchard ..... Indianapolis Power & Light Co., Indianapolis, Ind.
K. M. Robinson ..... The Washington Water Power Co., Spokane, Wash.
L. M. Smith ..... Alabama Power Co., Birmingham, Ala.
Harold Turner ..... American Gas and Electric Service Corp., New York, N. Y.

(*Terms expiring 1959*)

H. J. Cadwell ..... Western Massachusetts Electric Co., Greenfield, Mass.
Stuart Cooper ..... Delaware Power & Light Co., Wilmington, Del.
Carl J. Forsberg ..... Wisconsin Power and Light Co., Madison, Wis.
Allen S. King ..... Northern States Power Co., Minneapolis, Minn.
C. E. Kohlhepp ..... Jersey Central Power & Light Co., Asbury Park, N. J.
C. R. Landrigan ..... The Detroit Edison Co., Detroit, Mich.
J. E. Loiseau ..... Public Service Co. of Colorado, Denver, Colo.
Earle J. Machold ..... Niagara Mohawk Power Corp., Syracuse, N. Y.
D. C. McKee ..... The Empire District Electric Co., Joplin, Mo.
P. H. Powers ..... West Penn Power Co., Greensburg, Pa.
R. G. Rincliffe ..... Philadelphia Electric Co., Philadelphia, Pa.
R. E. Ritchie ..... Arkansas Power & Light Co., Little Rock, Ark.
W. H. Sammis ..... Ohio Edison Co., Akron, Ohio
J. R. Welsh ..... Southwestern Gas and Electric Co., Shreveport, La.
Erwin H. Will ..... Virginia Electric and Power Co., Richmond, Va.

(*Terms expiring 1960*)

W. C. Beckjord ..... The Cincinnati Gas & Electric Co., Cincinnati, Ohio
W. C. Bell ..... The United Illuminating Co., New Haven, Conn.
N. A. Cocke ..... Duke Power Co., Charlotte, N. C.
J. F. Davenport ..... Southern California Edison Co., Los Angeles, Calif.
T. W. Delzell ..... Portland General Electric Co., Portland, Ore.
G. S. Dinwiddie ..... New Orleans Public Service Inc., New Orleans, La.
Willis Gale ..... Commonwealth Edison Co., Chicago, Ill.
M. L. Kapp ..... Interstate Power Co., Dubuque, Iowa
W. T. Lucking ..... Arizona Public Service Co., Phoenix, Ariz.
W. W. Lynch ..... Texas Power & Light Co., Dallas, Texas
L. C. McClurkin ..... Savannah Electric and Power Co., Savannah, Ga.
J. J. McDonough ..... Georgia Power Co., Atlanta, Ga.
A. R. Schiller ..... Public Service Co. of New Hampshire, Manchester, N. H.
G. W. Van Derzee ..... Wisconsin Electric Power Co., Milwaukee, Wis.
J. Theodore Wolfe ..... Baltimore Gas and Electric Co., Baltimore, Md.

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K. M. Robinson, W. H. Sammis, G. W. Van Derzee

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

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A. D. Barney.....The Hartford Electric Light Co.
J. B. Black.....Pacific Gas and Electric Co.
Harllee Branch, Jr.....The Southern Co.
W. L. Cisler.....The Detroit Edison Co.
C. P. Crane.....Baltimore Gas and Electric Co.
T. G. Dignan.....Boston Edison Co.
Edgar H. Dixon.....Middle South Utilities, Inc.
Philip A. Fleger.....Duquesne Light Co.
George M. Gadsby.....Utah Power & Light Co.
D. E. Karn.....Consumers Power Co.
George L. MacGregor.....Texas Utilities Co.
Paul B. McKee.....Pacific Power & Light Co.
I. L. Moore.....New England Electric System
W. C. Mullendore....Southern California Edison Co.
Grover C. Neff.....Wisconsin Power and Light Co.
J. S. Osborne.....Central & South West Corp.
Philip Sporn.....American Gas and Electric Co.
L. V. Sutton.....Carolina Power & Light Co.
Frank M. Tait.....The Dayton Power and Light Co.
J. B. Thomas.....Texas Electric Service Co.
E. S. Thompson....The West Penn Electric Co. (Inc.)
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Customer Accounting, M. F. Young.....The Connecticut Light & Power Co., Hartford, Conn.
Customer Collections, J. E. Hevron.....New Orleans Public Service Inc., New Orleans, La.
Customer Relations, H. R. Potts.....Columbus and Southern Ohio Electric Co., Columbus, Ohio
Coordinator of General Activities Group, P. R. Lawson.....Pennsylvania Electric Co., Johnstown, Pa.
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General Accounting, G. F. Jones.....Potomac Electric Power Co., Washington, D. C.
Internal Auditing, R. B. Tritton.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Plant Accounting and Property Records, G. A. Brownmiller....The Connecticut Light & Power Co., Hartford, Conn.
Taxation Accounting, C. E. York.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Coordinator of Special Activities Group, C. T. Dwight.....The Hartford Electric Light Co., Hartford, Conn.
Accounting Developments Service, A. H. Kern.....Alabama Power Co., Birmingham, Ala.
Accounting Employee Relations, J. J. Leary.....Boston Edison Co., Boston, Mass.
Application of Accounting Principles, V. A. Kos.....Commonwealth Edison Co., Chicago, Ill.
Electronic Accounting Machine Developments, R. W. Britt.....Wisconsin Electric Power Co., Milwaukee, Wis.
Uniform System of Accounts, R. G. Schneider.....Virginia Electric and Power Co., Richmond, Va.

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Commercial Sales Group, H. R. Jones.....West Penn Power Co., Greensburg, Pa.
Farm Group, M. O. Whithed.....Atlantic City Electric Co., Atlantic City, N. J.
Industrial Power & Heating Group, F. E. Wiatt.....The Cincinnati Gas & Electric Co., Cincinnati, Ohio
Residential Group, Robert L. Coe.....Union Electric Co., St. Louis, Mo.
Special Services Group, B. L. Palm.....Central Illinois Public Service Co., Springfield, Ill.

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Hydraulic Power, E. S. Harrison.....Georgia Power Co., Atlanta, Ga.
Meter & Service, Floyd Salmon.....Central Power and Light Co., Corpus Christi, Texas
Prime Movers, V. L. Stone.....Commonwealth Edison Co., Chicago, Ill.
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Area Development, S. F. McGowan.....Northern States Power Co., Minneapolis, Minn.
Atomic Power, E. L. Lindseth.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Awards, M. C. Albrittain.....Baltimore Gas and Electric Co., Baltimore, Md.
Electric Power Survey, Arthur S. Griswold.....The Detroit Edison Co., Detroit, Mich.
Financing & Investor Relations, L. E. Reynolds.....The Connecticut Light & Power Co., Hartford, Conn.
Industrial Relations, E. J. Brill.....Pennsylvania Power & Light Co., Allentown, Pa.
Insurance, D. E. Williams.....The Cleveland Electric Illuminating Co., Cleveland, Ohio
Legal, J. M. Keegan.....Consolidated Edison Co. of New York, Inc., New York, N. Y.
Membership, E. S. Thompson.....The West Penn Electric Co. (Inc.), New York, N. Y.
Purchasing and Stores, T. S. Dunstan.....Consolidated Edison Co. of New York, Inc., New York, N. Y.
Rate Research, L. W. Frank.....Western Massachusetts Electric Co., Springfield, Mass.
Regulation, C. E. Kohlhepp.....New Jersey Power & Light Co., Denville, N. J.
Research Projects, E. H. Snyder.....Public Service Electric and Gas Co., Newark, N. J.
Statistical, A. E. Bush.....The Detroit Edison Co., Detroit, Mich.
Tax Policy, C. B. McManus.....The Southern Co., Atlanta, Ga.
Technical Assistance for Overseas Visitors, Harvey Bumgardner.....The Detroit Edison Co., Detroit, Mich.
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